THE IMPACTS OF TOURIST & RESIDENTIAL DEVELOPMENT ON THE KWAZULU – NATAL NORTH COAST: UMHLANGA ROCKS TO SALT ROCK

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Submitted in Partial Fulfillment of the Requirement for the Degree of Master of Arts in the School of Environmental Sciences, Faculty of Humanities

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November 2005

DECLARATION

I, Fathima Ahmed hereby declare that this dissertation titled: THE IMPACTS OF TOURIST & RESIDENTIAL DEVELOPMENT ON THE KWAZULU - NATAL NORTH COAST: UMHLANGA ROCKS TO SALT ROCK, is as a result of my own investigation and research and has not been submitted in part or in full for any other degree or to any other institution or university.

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ABSTRACT

The multiple uses of coastal space, the implications of coastal processes on society and the fragility of the marine – terrestrial interface requires integrated and sustainable coastal management strategies – one where humans can live harmoniously with nature. On the KwaZulu – Natal north coast of South Africa, property development is a key feature of economic development. The last two years have witnessed an unprecedented increase in up – market real estate along this coastline. This has been based on an increasing demand for coastal property for the development of tourist, commercial and residential development. It is also a sector that has contributed much towards environmental damage to sections of the coastline and places a considerable burden on current infrastructure (sewage, water and roads).

A time-series analysis of aerial photography, spanning a period of 20 years (1983 and 2003), was used to assess the collective impacts of development on both land use and important ecosystems since 1983. The rate of change indicates significant decreases in coastal forest (3%), cultivated land (3%), rivers (1%), sugar cane (3%) and untransformed grassland (1%). There was a concomitant increase in non – residential development (2%), residential (4%), transformed grassland (2%), transport corridors (2%) and wetlands (0.4%).

A social perspective from a total sample of 50 respondents was achieved by administering questionnaires off five different key coastal stakeholders (planners/managers/local authorities, CBOs, environmental groups, developers and tourism interest groups) to establish their perspectives on overall development, legislation, the state of the environment and stakeholder participation in coastal issues in the study area.

The results yielded the following: development is currently occurring in an *ad hoc* fashion due to the amount of land owned privately. This is further compounded by the lack of legislation such as land use management systems and a Coastal Management Act which would allow for control over development. The biggest non-compliance issue is adhering to environmental management plans (EMPs). There are conflicts and constraints coupled with capacity issues which do not allow for effective management or the curtailment of bad land uses. The environment is being impacted on to a large degree through rationalization rather than expanding environmental concerns. Lastly, while stakeholders in the area are active, political decisions are still taken.

In conclusion, while the White Paper for Sustainable Coastal Zone Management in South Africa advocates 'sustainability', the only thing being sustained on this coastline is development. This coastline will probably provide significant opportunities for tourism, but its amenity from a natural perspective will be lost.

ACKNOWLEDGEMENTS

The financial assistance of the National Research Foundation (NRF) and the Black Academia Scholarship towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at, are those of the author and are not necessarily to be attributed to the NRF or the Black Academia Scholarship.

I would like to express my gratitude to Dr S. Pillay who supervised this research, and afforded me the opportunity to present its findings at a conference in Mauritius in August/September 2005. His encouragement of independent work has contributed to my personal development.

I thank my co-supervisor, Mr. J. S. Lutchmiah for all the assistance he provided me with this research. I would especially like to thank him for working with me through the proposal. His constant encouragement is greatly appreciated.

I owe a wealth of gratitude to Mr. Omar Parak of DEAT, who has guided me from the inception of this research, invited me to a workshop and meetings which proved invaluable to my growth of knowledge about issues in my study area, and afforded me the opportunity to meet the stakeholders involved. I hope I have done justice to the effort and time he has devoted to me.

I owe a special thank you to Michael Gebreslasie who did the scanning and digitizing of aerial photography for this research. The site visits we conducted were a collaboration of perceptions that were an inspiration to this research.

I thank Terence Pillay for providing me with initial and invaluable reading material when I first began this research.

I would like to thank Riyad Ismail for providing valuable GIS and secondary data for this research.

I thank Ismail Banoo for providing valuable comments, recommendations and advice on issues pertaining to this research and the writing of this research. He has always been accommodating, amazingly kind and patient.

I owe an eternal debt to my friends, Noelene, Nitesh and Natasha - who have constantly cared and kept up my spirits through good times and dark times these past two years.

A special thank you goes to my husband Shiraz Ismail who is responsible for sparking my interest in this topic, before it was even an idea for a research. I thank him for assisting me with the technical aspects of this research, and for remaining good tempered even when our entire room disappeared under a sea of papers and books. He shares full collaboration in this research.

I thank all who have participated in and shown enthusiasm for this research.

LIST OF ACROYNMS

BRG	- Bioresource Group
BRU	- Bioresource Unit
CBD	- Central Business Distract
CBO	- Community Based Organisation
CMPP	- Coastal Management Policy Plan
CPA	- Coastal Protected Area
CSIR	- Council for Scientific & Industrial Research
CWG	- Coastal Working Group
CZM	- Coastal Zone Management
CZMP	- Coastal Zone Management Plan
DAEA	- Department of Agriculture & Environmental Affairs
DEAT	- Department of Environmental Affairs & Tourism
DMA	- Durban Metropolitan Area
D'MOSS	– Durban Metropolitan Open Space System
ECA	- Environmental Conservation Act
EIA	- Environmental Impact Assessment
EMP	- Environmental Management Plan
GIS	- Geographic Information System
HWM	- High Water Mark
ICZM	- Integrated Coastal Zone Management
IDP	- Integrated Development Plan
IEM	- Integrated Environmental Management
IFA	- International Financial Advisors
LAP	- Local Area Plan
LUMS/P	– Land Use Management System/Plan
NEMA	– National Environmental Management Act
NGO	- Non-Governmental Organisation
ORV	– Off Road Vehicle
PCC	– Provincial Coastal Committee
RUA	– Recreational Use Area
SCA	– Sensitive Coastal Area
SCL	- Sustainable Coastal Livelihood

SDI	- Spatial Development Initiative
SEA	– Strategic Environmental Assessment
SFP	- Spatial Framework Plan
SIA	– Social Impact Assessment
SLR	– Sea Level Rise
SOE	– State of the Environment
TMS	– Table Mountain Sandstone
WESSA	– Wildlife and Environmental Society of South Africa
The White Paper	– White Paper for Sustainable Coastal Development in South Africa
WTO	– World Trade Organisation

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CHAPTER ONE: INTRODUCTION

1.1 Introduction

Man's role on earth has evolved from one in which he was subordinate to his environment, accepting passively the fortunes and misfortunes conferred by nature, to one in which he is dominant, adapting and modifying the environment to suit his needs. Man has thus transformed the pristine, increasing his impacts in extent and variety with his increasing numbers and increasing skill (van der Eyk, *et al.,* 1969).

High population densities, linked with urban growth; expanding tourism and industrialisation pose major threats to coastal resources and biological diversity. (Clark, 1995) argues that the greater the level of economic development, the greater the threat to the environmental resources, as economic demand for a given resource will commonly exceed the supply (be it land, fresh water, wood or fish).

The majority of the world's population lives close to the sea. Goldberg (1994, cited in French, 1997), states that 50 % of the world's population lives within 1km of the coastal zone, and that this population is predicted to grow at a rate of 1, 5 % over the next decade. According to Carter (1988), many coastal populations exhibit growth rates that are expanding faster than national populations, and that these trends are dominated by specific cohorts – the retired and young professionals.

In addition to this fixed (somewhat predictable) population, coasts often experience seasonal 'booms' in a large and transient population – the tourist. The element of

unpredictability is highlighted in the fact that tourism development differs from any other in terms of intensity and number of people located in an area, resulting in impacts being more concentrated (French, 1997). With the increase in leisure time and demand for facilities, significant portions of the world's coasts have become committed to tourist development. Miller (1993, cited in French, 1997), highlights the significance of tourism, and indicates that 12, 3 % of the world's total consumer spending goes on tourism and that the industry creates jobs for 6, 5 % of the world's workforce. Clearly, this world commitment to a single industry places immense pressure to maintain tourist popularity, and as a result, environmental concerns come a poor second to commercial demands (French, 1997).

Development trends in coastal areas worldwide indicate that shoreline real estate is in strong demand, and this demand, which responds to essential needs for economic growth, leads to a linear approach to coastal development, focussing on land along the water's edge, wetlands, land with beach access and, or sites that command stunning sea views (Clark, 1995). This demand places immense pressure on these systems. Collectively, the biggest problem linked with the demand for coastal space is coastal erosion and the resulting need for defences. Coupled with this, the process of human-induced change is continuing against a backdrop of long-term environmental change such as sea level rise (also human-induced) (French, 1997).

Cooper (1991) argues that, it has been found that if there is no development in sensitive and dangerous areas (such as in the shoreline area), then no problems will be perceived and the coast will be free to fluctuate and regain equilibrium under a new set of conditions. However, inappropriate citing of development, and exceeding the

land's carrying capacity has placed severe stresses on coastal environments and may promote adverse and irreversible damage or complete failure of the natural systems that work on the coast.

Environmental deterioration threatens the foundation upon which tourism and residential development rests. Coastal zones are unique – things such as beaches, mangrove forests, dunes and estuaries are only found at the coast. Because of these features, and because coastal enterprise is so distinctive, most countries recognise the coastal zone as a distinct region with resources that require special attention, and planning is beginning to address this (Clark, 1995).

To this effect, many countries are beginning to implement integrated coastal zone management (ICZM) strategies to manage the coast. The distinctive feature of ICZM is that it is multi – sectoral and seeks to integrate and coordinate the activities of existing and future uses of the coast. In South Africa, the White Paper for Sustainable Coastal Development (DEAT, 2000a), is the main policy guiding development at the coast and it has ushered in a new era of thinking and taking action on coastal issues in South Africa.

1.2 Structure of the Study

The structure of this study is as follows: chapter one provides an overview of the trends and issues in coastal zone management (CZM). Chapter two (literature review) discusses focussed points of importance such as coastal processes, coastal governance, biodiversity, tourism, land use, need for the study and the aims and

objectives. Chapter three provides a detailed description of the study area, and future trends. Chapter four presents the methods used. Chapter five comprises the results and discussion. Chapter six presents the conclusions and provides recommendations for the future of the study area and coastal zones in general.

CHAPTER TWO: THEORETICAL REVIEW

2.1 The Physical Environment

2.1.1 The Coast

Bird (2000), defines the coast as a zone of differing width, which includes the shore, and has a range that also covers the landward limit of penetration of marine influence (ie. the crest of a cliff, the head of a tidal estuary, or the solid ground that lies behind coastal dunes, lagoons and swamps).

Coastal waters extend from the low water mark into the sea, up to a point where it is no longer influenced by land and associated activities (Glavovic, 2000a). The coastline (or shore) is the area between low and high water mark (HWM) that is exposed during low tide and covered during high tide (Glavovic, 2000a). Beaches and foredunes together form an environment known as the littoral active zone. Within this zone, sand is moved naturally by wind, water and gravity (DEAT, 1998d).

While much focus over the years has centred on biophysical definitions of the coast, focus has now shifted to an inclusion of a social definition. Glavovic (2000a) defines the coast as a place where coastal ecosystems, society, culture, the economy and the institutions of governance converge and interact. These different connections rarely coincide hence the coast is also a place of intense competition and conflict.

2.1.2 Natural Coastal Systems

Carter (1988) states that, an application of natural coastal systems is required in order to solve the social problems on the coast. Beaches are the most sensitive and delicately balanced mechanisms of the coastline (Pethick, 1984). According to Brampton (cited in Barrett, 1992), beaches absorb the most part of incident wave energy by continually adjusting its shape, hence reducing the forces on the structures behind. Three elements are essential for the formation and maintenance of a beach – adequate and constant supply of sediment, a shoreline along which it can move, and substantial energy to move the sediment (Bascom, 1960). A long-term reduction in any of these elements renders the beach incapable of executing its protective role, hence coastal erosion and loss and damage to human property and life occur.

Coastal systems are complex and hence makes their complete descriptions difficult and accurate predictions improbable (Woodroffe, 2002). However, several authors concur that most physical coastal change is associated with the movement of sediments (Bird, 1969, 2000; Bascom, 1960; Carter, 1988). Sediments are supplied to the nearshore (littoral) system from a number of sources (eg. erosion of cliffs and that provided by rivers) and is circulated in that zone by currents (long-shore and on-off shore). In this zone, sediments are either retained or lost to a number of sinks (beach, dunes, or estuary mouths).

The two principle processes linked with the movement of sediment are erosion and accretion (deposition). Abundant literature indicates that erosion is the dominant shoreline process. There is presently a worldwide tendency towards shoreline erosion

(Bird, 1976, 1981, 1985; Pascoff, 1981; Tanner & Staper, 1972), which is usually apparent in the progressive retreat of backshore cliffs, dunes and the resulting landward displacement of the shoreline (Carter, 1988).

The extent to which the coast is likely to erode or accrete depends to a large extent on the composition of material (eg. rock type; mass) and the intensity of the energy acting upon it (wind, tides, waves, currents and storms). These factors are responsible for the character or profile of beaches. Beach profiles vary from region to region, for example, sandy shores are more mobile and hence prone to more erosion than more stable rocky shores; some coasts are more prone to stormy seas but others may be protected by sheltered bays or behind islands. According to Glavovic (2000a), indications (while estimates may vary) are that sandy shores make up about 80% of South Africa's coastline, with rocky shores and mixed sandy-rocky shores making up the remainder.

2.1.3 Nearshore Circulation

Hardisty (1990) has distinguished two principle nearshore processes which are shaped by wave action – shore-normal processes (offshore and onshore) and that which is parallel to the shore (longshore) processes. Profiles of beaches shaped by shore-normal processes are generated by the swash generated as waves break upon the shore, driving sediment shoreward; and the ensuing backwash which takes sediment offshore (Pethick, 1984). The grain size of sediments and beach permeability also influence swash-backwash conditions. Breaking waves are likely to build the profile on a shingle beach, where backwash energy is diminished by percolation, than on a

sandy beach where the backwash is more effective in removing sediment back into the sea (Bird, 2000).

Waves are formed by a disturbance over the water surface, which in most cases, can be attributed to wind and gravitational force, but sometimes also as a result of earthquakes. During disturbances such as these, energy and momentum are transferred to water masses and transmitted in the direction of the impelling force (Carter, 1988). Wind generated waves are influenced by wind speed, duration and distance over which it blows - the faster the wind, the longer it blows and the greater the distance over which it blows, the larger the wave it raises (Bascom, 1960). Coasts exposed to stormy seas are known as high energy coasts and storm induced waves have the capacity to change beach profiles rapidly. Normally, however, the waves that shape the beach have moved out from under the winds that generated them and are longer, lower and more regular than wind waves and are known as swell (Bascom, 1960).

During storms, beach profiles are lowered and cut back by strong wave action (plunging and surging waves), which have limited swash and stronger backwash, resulting in sediment being withdrawn to the nearshore, leaving a concave profile (Bird, 2000). In calmer weather, spilling waves, with stronger swash than backwash, moves sediment up the beach, rebuilding a convex profile (Bird, 2000). According to Komar (1976), the main shift that might be discerned (in beach profile) is the annual change commonly referred to as summer and winter profile, or storm versus swell.

According to Bird (2000), storms are more frequent in winter and therefore many beaches show a seasonal sequence of winter cut and summer fill. A similar situation occurs off the west coast of South Africa, where winter storms are more pronounced and beaches tend to become narrower and steeper. However, the opposite occurs along the east coast, where winds and storms are more pronounced in summer (Glavovic, 2000a). Steep beach profiles usually possess a marked landward bar - the berm, which forms at the limit of the wave swash (Pethick, 1984). The transition of the beach profile from steep to shallow gradient is marked by the removal of this berm and the subsequent deposition of a bar just below low tide level – known as the longshore bar.

Beach profile type is important to sea cliff and coastal property erosion. The swell profile protects cliffs from wave action by a wide berm, hence little or no erosion occurs. During storm conditions, sand is shifted offshore and the berm lost, so more intense swash is able to reach and erode cliffs and property (Komar, 1976).

In addition to onshore and offshore sediment shifts, longshore processes (which occur beneath the water surface) are the chief cause of sediment transport that also impact on beach profile. Longshore sediment transport is also termed littoral drift. According to Cooper (1991), when waves break obliquely to the shore a longshore movement of sand is created in the direction of the dominant wave approach. A beach also has limits in the longshore direction –a point of land or a stream may make such a boundary (Bascom, 1960). According to Woodroffe (2000), longshore drift is indicated by the following: the direction in which spits have been built across estuaries, or river mouths have been diverted, or on the side on which sand builds

against groynes, breakwaters or other obstructions, including natural headlands and rocky outcrops.

Komar (1976) attributes beach erosion to the construction of jetties, breakwaters and groynes, which act as dams to the littoral drift, causing a build-up of the beach on its updrift side and simultaneous erosion in the downdrift direction. A similar situation occurs at the recreational beaches of Durban. They have been eroded as a result of port facilities, piers and groynes. A beach nourishment programme was started in the 1990s, which cost more that R8 million annually to dredge and pump sediment from the harbour mouth. An absence of this programme would result in the removal of Durban's recreational beaches (Glavovic, 2000a).

Recognising the key role of beaches in protecting the coast, and acknowledging the recreational potential and the need for environmental conservation, engineers are increasingly turning to 'soft' defence options like beach nourishment (Brompton; cited in Barrett, 1992).

Another significant type of wave which reaches the coast is the tide. Tides are caused by the gravitational pull of the moon and sun on the ocean waters of a rotating earth. The most common tidal pattern is the semidiurnal one – there are two high tides and two low tides each day (Little & Kitching, 1996). High and low tides are synonymous with the crest and trough of a wave with a length of hundreds of kilometres (Pethick, 1984). They are important because they lead to regular changes in the level of the sea along the coast, and because currents are generated as the tide ebbs and flows (Bird,

1969). According to Glavovic (2000a), tidal currents are not pronounced along South Africa's coast.

2.1.4 Sea Level Rise

The relevance of sea level rise (SLR), warrants mention in any research pertaining to the coast. However, statistics on SLR differ. Furthermore, SLR statistics are better documented in developed countries than in developing countries. The general consensus is, however, that sea levels are rising as a result of human-induced climate change (Bird, 2000).

It is important to note that SLR controls the type and magnitude of all coastal processes – tidal range, wave type, longshore current velocities, sediment rates; and other variables like changes in rainfall, temperature and vegetation (Pethick, 1984). Hence, it is something that warrants inclusion into coastal management.

2.2 Coastal Governance

2.2.1 Integrated Coastal Zone Management

The first major national focus on CZM emerged with the implementation of the United States Coastal Zone Management Act in 1972. This Act recognised the deficiencies in sectoral approaches to CZM and heralded in a new approach which involved integrated plans focussing on selected issues on national and local significance. Since then, the concept was refined and has been applied to countries around the world.

Integrated Coastal Zone Management (ICZM) establishes a process whereby government intervention can be organised, informed and effective through programmes that are integrated with various economic sectors and conservation programmes (Clark, 1995). Furthermore, the advantage of ICZM (multiple use approach) over traditional sectoral (single use) approaches is that it provides a framework for broad participation and conflict resolution between a variety of stakeholders.

In the 1970s and 1980s, a variety of coastal management activities were executed in South Africa, but they occurred on a sector specific basis – nature conservation, fisheries management, land use planning etc. Prior to 1997 (when Environmental Impact Assessment procedures became mandatory in terms of the Environmental Conservation Act of 1989), development applications were assessed on an *ad hoc* basis, and development was controlled through administrative regulations and expert advice (Glavovic, 2000b).The shift towards realising the need for ICZM coincided with the broader political transition in South Africa in the early 1990s, when a wide variety of civil society became actively involved in different aspects of public policy, decision-making and management (Glavovic, 2000b).

The White Paper on Sustainable Coastal Development in South Africa, (hereinafter known as the White Paper) heralded in a fundamental shift in thinking about the coast and ushered in a new era for CZM in South Africa. It advocates the following shifts from previous coastal management efforts: it recognises the value of the coast, it facilitates sustainable coastal development, it promotes a holistic way of thinking by

promoting co-ordinated and integrated coastal management, it introduces a facilitatory style which responds to diversity, co-operation and shared responsibility by a range of actors (DEAT, 2000a).

Although a Coastal Management Act does not exist at present, coastal management is largely guided by the White Paper which is policy. The White Paper builds on extensive work and consultation of the Coastal Policy Green Paper (circulated in 1998) and the Draft White Paper for Sustainable Coastal Development in South Africa (circulated in 1999). To implement components of the White Paper, a new draft National Coastal Management Bill makes provisions for the institutions needed for ICZM.

2.2.2 Government Roles and Functions

Governance and their related functions operate at various levels:

National Government – in general, this level does not consider coastal management as a distinctive part of its responsibilities due to the absence of clear policy guidelines. Hence, it relies on sectoral based functions (departments) to carry out specific functions. Management functions affecting the coast are primarily carried out by the Marine and Coastal Management Chief Directorate of DEAT, and the sub-directorate Coastal Management which are responsible for policy formulation, advisory roles and education. Sector functions are also carried out by the Department of Water Affairs and Forestry, Department of Transport, Department of Agriculture, Department of Public Works, Department of Land Affairs and the Department of Minerals and Energy.

Provincial Government – much coastal management is carried out at this level, in conjunction with environmental and nature conservation departments. Responsibilities include reviewing provincial legislation and the state of the coast in the province, planning down to the HWM and reviewing provincial recreation amenities (DEAT, 2000a). Coastal Working Groups (CWG) or Provincial Coastal Committees (PCC) have been established in each province to improve co-ordination of coastal management. In KwaZulu - Natal, the Department of Environmental Affairs, Coastal Management Unit, has established the Draft KwaZulu - Natal Coastal Management Policy which draws from the White Paper, but is specific to the province of KwaZulu - Natal.

Local Government - Apart from being involved in the day-to-day administration of responsibilities within their localities, local institutions have been established within the municipalities to co-ordinate the interaction of various coastal managers. This has been initiated in light of implementing the White Paper and the draft Coastal Management Bill. To this end, Coastal Working Groups (CWGs) have been established. CWGs are relatively new structures (operating since 2003), and are still in the process of being developed. In this regard, their legal status is also under consideration. According to Govender (2004), CWGs provide platforms for local level planning decisions, they act as developmental watchdogs and assist local residents in networking with relevant officials who are able to act on issues of concern, and who would have otherwise not been accessible and/ or unknown to the public.

Current limitations to the execution of coastal management of the CWGs are: staff shortages, lack of skills and inadequate financial and other resources. They are also involved in DEAT-funded projects like – Sustainable Coastal Livelihoods (SCL) Projects, Working for the Coast, Blue Flag Beaches, etc. However, the sustainability of these projects remains uncertain once the funding is discontinued. It is for this reason that these projects have not been included into the Integrated Development Plans and municipal budgets (Govender, 2004).

2.2.3 Legislation Governing the Coast

The coast can, at best, be described as consisting of a tapestry of legislation.

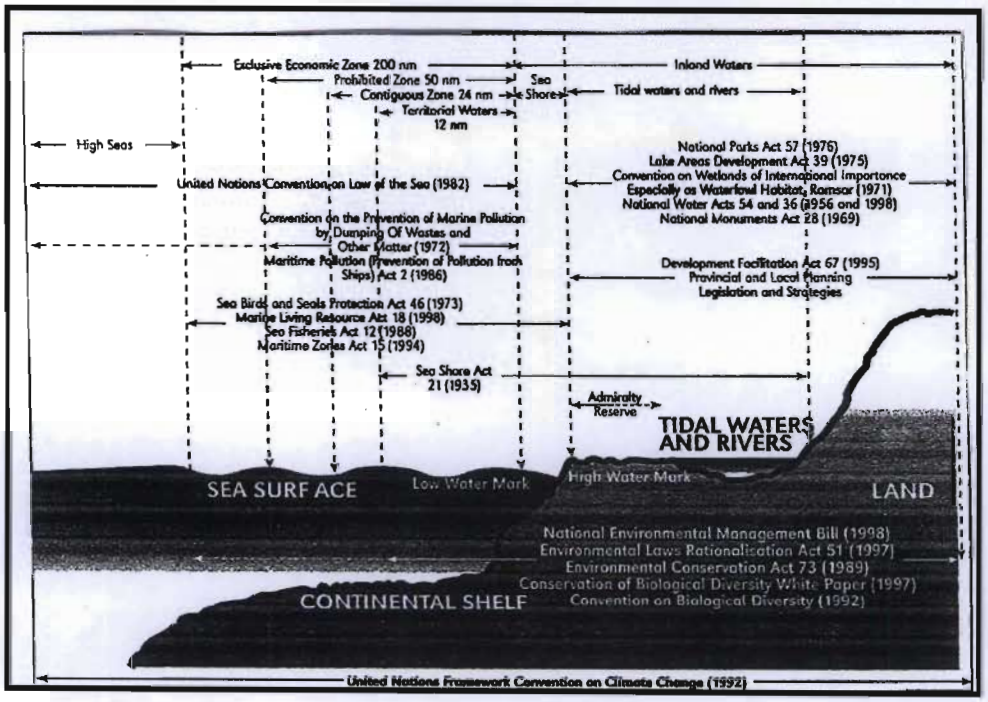


Figure1.1 Legislation governing the coast (Coastal Management Policy Plan, 2000; cited in Glavovic, 2000a)

Some of the Key Legislations include:

The Constitution Act 108 of 1996

The Constitution provides the overall framework for legislation informing coastal management. With regard to the environment, Section 24 states that everyone has the right to an environment that is not harmful to their health and well-being and the right to have the environment protected for the benefit of the present and future generations.

Sea Shore Act 21 of 1935

Although it is an old Act, it is fundamental to any existing or proposed institutional arrangement for the coast. The Act operates on the premise that ownership of the sea and sea shore is vested in the President, for the use and benefit of the public. Administrative functions of the Act have largely been assigned to the coastal provinces. This act needs to be updated in order to conform to the Constitution and be consistent with other newer legislation. The Act allows for specific uses of the area but does not provide for any forms of access rights to the sea shore from above the HWM.

It also does not address the issue of management of the Admiralty Reserve, a narrow strip of state owned land (between 45,7m and 60m wide), that is dispersed along the KwaZulu – Natal and Cape coastlines above the HWM. The Reserve also extends up to the point where the tidal influence is felt in estuaries. The Reserve is not legislation but is reflected in terms of title deeds. Where the Reserve does exist, it is usually recorded on the original diagram (surveyor general) of the property that is separated from the sea by such Reserve. However, the unambiguous wording of the deed of

grant takes precedence over the diagram where there is conflict between the two. Its administration lies with the Department of Public Works, however, portions have been handed over to local authorities in the form of grants and leases. These municipalities are responsible for ensuring that abuses such as the erection of permanent and temporary structures, destruction of vegetation, and removal of earth materials does not take place.

Environment Conservation Act 73 of 1989 (ECA)

The Act was originally passed to provide a basis for environmental conservation in South Africa. Most of the provisions of this Act have been repealed by the National Environmental Management Act (NEMA), except for sections of Part V and Part VI, which provide for the "Control of Activities which may have a Detrimental Effect on the Environment" and the associated Environmental Impact Assessment regulations which remain in force until they are replaced with new regulations promulgated under NEMA.

National Environmental Management Act 107 of 1998 (NEMA)

The Act establishes a framework to give effect to the White Paper on Environmental Policy for South Africa. It emphasises the principle of co-operative governance and ensures that the environmental rights provided for in the Constitution are protected and fulfilled. The Act requires that DEAT act as lead agent to ensure effective custodianship of the environment.

A number of relevant instruments have been proposed to implement this Act: a set of principles that are to apply throughout South Africa; a National Environmental

Advisory Forum to inform the Minister about stakeholder views regarding the application of the Act; a Committee for Environmental Co-ordination to promote the integration and co-ordination of government environmental functions; the preparation of Environmental Implementation and Management Plans by state organs; environmental management co-operation agreements to allow for co-management involving different stakeholders; and the preparation of model by-laws aimed at establishing environmental management systems within municipalities.

Regulations that control the use of off-road vehicles in the coastal zone were proclaimed in terms of this Act. NEMA is currently responsible for mainstreaming and integrating environmental aspects into planning and economic processes through all spheres of government

Marine Living Resources Act 18 of 1998

This Act seeks to ensure the sustainable use of marine living resources through scientifically based and publicly acceptable management. It emphasises the fair and equitable access to resources, gradual transformation of fishing methods, utilisation fees and a favourable environment in fisheries.

Development Facilitation Act 67 of 1995 (DFA)

This Act sets out to facilitate and fast-track development programmes and projects in relation to land, and lays the general principles governing land development in South Africa. It sets out principles that state that policy, administrative practice and laws should promote efficient and integrated social, economic, institutional, physical and environmentally sustainable land development.

World Heritage Convention Act 49 of 1999

This Act sets out to create a legal and administrative framework for various cultural and natural sites in South Africa that have or will be granted World Heritage Site status by the World Heritage Committee of the United Nations Education, Social and Cultural Organisation eg. Greater St Lucia Wetlands Park.

Municipal Systems Act 32 of 2000

This Act provides a framework for planning, effective use of resources, and the organisational change in a business context. The Act also requires local authorities to compile Integrated Development Plans (IDPs), build public-private partnerships, engage with the public etc. Municipalities will have to pass bylaws to implement the policies.

2.2.4 Local Authority Role in CZM

Local authorities are responsible for the day-to-day management of the coast – natural resource management and allocation, land use planning, land development, catchment management, coastal engineering, local economic development, environmental assessments, tourism, housing service delivery and strategic planning through IDPs (Govender,2004).

2.2.4.1 Integrated Development Plans

The IDP is the most important strategic planning instrument, which guides and informs all planning, management and development within a Municipality (DAEA, 2003). The IDP supercedes all other plans that guide local development.

State of the Environment Reports (SOE) can provide useful information and guidance with IDPs. Furthermore, SOE reports include information on the causes and effects of environmental change (DAEA, 2003). Strategic Environmental Assessments (SEA) also provides useful information that guides IDPs. Within the SEA there is a requirement for a situational analysis which describes the current SOE and includes an analysis of trends in the social, economic and biophysical environment as well as a description of relevant policies, plans, legislation and institutions (DAEA, 2003). According to Govender (2001), DEAT has recently initiated a programme for the integration of the SEA and IDP.

2.3 Coastal Biodiversity

Biodiversity refers to the variety of living organisms at the genetic, species and ecosystems level. Species is the central element of biodiversity, as isolated genes generally do not occur in single individuals, but in combinations which define the species (German Federal Agency for Nature Conservation, 1997). Ecosystems are important as they constitute the basis for species existence, and their destruction is the most significant threats to the survival of the species dependent on them (German Federal Agency for Nature Conservation, 1997).This thesis will concentrate on some of the critical coastal ecosystems.

The values of high biodiversity for man are: directly (for food production and medicine), to support production (forests for erosion protection and water storage, estuaries for flood protection and breeding grounds for fish), to stabilise the biosphere

(global climate), as an immaterial (ethical, cultural, aesthetic) value, which can be 'transformed' into material values via tourism (German Federal Agency for Nature Conservation, 1997).

In recent decades, the nature of coasts and the immediate hinterland have changed profoundly in many cases. The natural processes and functions of coasts are increasingly being influenced by man's intrusion. Coastal development and tourism are often the largest initiators of change. Ecosystem/habitat types that will be valued for this research are: rocky shores, sandy beaches, dunes and forests, and estuaries with their associated wetlands.

2.3.1 Rocky shores

Topographically, rocky shores are more variable than other coastal habitats. South Africa's rocky shores vary from, either steep cliffs and headlands projecting into the sea, or boulder beaches and wave-cut platforms, with gullies cutting out tidal pools between low and HWM (Glavovic, 2000a). Where the coastline curves inland between two rocky headlands, a sheltered bay is formed (Bird, 1969). This would provide ideal locations for port and small-craft harbour development (depending on water depth). However, South Africa has relatively few bays of this nature (Glavovic, 2000a).

Organisms living on rocky shores are exposed to harsh physical environments. While most rocky shore organisms are fundamentally 'marine' they also have to cope with the rigours of life in air (Little & Kitching, 1996). Without water cover most algae stop photosynthesising, most aquatic animals stop feeding, respiratory problems arise

for these animals because aquatic exchange systems work inefficiently in air; and temperature changes and desiccation cause major problems for both plants and animals (Little & Kitching, 1996). Rocks are important surfaces for these plants and animals which must stave of dislodgement by waves and currents.

Typically, seaweed forms the base of the rock food chain. These are eaten by a variety of invertebrates such as chitons, winkles, limpets and crabs. Pieces of seaweed broken by wave action provide food for filter feeding organisms such as sponges, barnacles, mussels and oysters, which in turn are fed upon by animals such as anemonies, fish, octopus and birds (Glavovic, 2000a).

Rocky shores host a diversity of species, which tend to support both subsistence and commercial activities. However, many of these ecosystems have been sadly overexploited in many parts of the world. Seigfried (1994, cited in Little & Kitching, 1996), states that both Chile and South Africa provide good examples of such exploitation – 182 400 tonnes of algae (mainly kelp) are collected each year in Chile and 30 000 tonnes in South Africa; while 500 tonnes of lobster are caught per year in Chile and 3 000 tonnes in South Africa. In South Africa, overfishing of the lobster has necessitated the introduction of catch quotas and minimum size of individuals caught, but even so, populations have been severely reduced.

Removal of seaweed causes fluctuations in the entire supporting populations. Seaweed is commercially harvested in many countries for human consumption, cattle meal, industrial uses, fertilizers, aquaculture, and for the removal of excess nutrients from sewage treatment (Boaden & Seed, 1985).

2.3.2 Sandy Beaches

Sandy beaches are generally considered to be sparsely populated, unproductive ecosystems and devoid of activity. This is probably so because most of the animals that live on sandy beaches spend their time below the surface of the sediment (infauna), hence the importance of maintaining a sufficient sediment budget. According to Carter (1988), grain size is the crucial factor determining populations within the beach , although it is largely influenced by both porosity and packing of shore sediments.

According to Little & Kitching (1996), some of the benefits of sediments are as follows: finer sediment usually retain large amounts of water at low tide so death of organisms by desiccation is not as big a problem as that on rocky shores (but could be on shores with coarser sand); at high tide sediments act as buffers against changes in salinity, temperature and pH; because organic material usually ends up as small particles, they accumulate in sediments, which makes food availability easier for organisms. It is for these reasons that sandy beaches boast more species than gravel beaches. Boaden & Seed (1985), also acknowledge that hydronamic regimes which allow sediment build–up are also likely to allow deposition of organic particles.

Beaches act like gigantic filters where bacteria in the sand purify large quantities of water by breaking down organic particles into simpler compounds. For instance, 95% of organic matter can be broken down in just one flush of water (Glavovic, 2000a). Beaches are also important nesting grounds for birds and turtles.

2.3.3 Dunes

Beach environments are typically associated with strong winds, high salt load and the constant movement of sand. Dunes are associated with beaches and are formed as a result of the stabilisation of transported sediment by vegetation, which tends to slow down air flow. Dunes can therefore be defined as the vegetated parts of a beach. According to Glavovic (2000a), on moist coasts (eg. the east coast of South Africa), dune vegetation can be divided into four distinctive plant communities, from that closest to the shore and moving landward: youngest pioneer strand community comprising low creeping grasses and succulent herbs, which aid in initial dune build-up; shrub community made up of shorter bushes; 'clipped-hedge' canopy of the shrub-thicket community and the forest community

As dunes develop, the organic content and nutrient level of soils increase thus making them richer (Boaden & Seed, 1985). Because vegetation slows down air flow, the influence of sea spray (and hence salinity) is also reduced. Plant growth improves as one moves inland and this is accompanied by a greater diversity of plant and animal species. The water-holding capacity of dune soils also increases as the organic content builds up (Boaden & Seed, 1985). Hence dunes act as recharge zones, as well as to support an elevated water table (Carter, 1988). Dune sands initially have a high calcareous content (ie. they are base rich due to shell fragments), but this is gradually leached out, enabling colonisation and eventual succession by forests (Boaden & Seed, 1985). The low nutrient status of most dune plant communities is not especially attractive to intense food chain activity, although a large number of insect species and mammals such as moles have been recorded (Carter, 1988).

If properly managed, dunes serve a number of important functions. They store and release sediments in the littoral active zone, they provide a barrier for coastal property and they provide attractive recreational sites. However, human interference to dunes – mining, trampling and development has made them vulnerable. Removal of dune vegetation results in blow-outs (unconsolidated sand which is easily moved by wind and water). Removal of mature vegetation can induce exceedingly serious instability, such as the massive mobile sand sheets in Oregon and Washington (Cooper, 1958, cited in Carter, 1988). The Mediterranean has an estimated loss of 71% of its dunes due to the construction of tourist facilities (German Federal Agency for Nature Conservation, 1997). Furthermore, dune destruction results in saline intrusion into the water table, resulting in death of adjoining vegetation and loss of groundwater supplies of drinking water for communities (Carter, 1988).

2.3.4 Estuaries

Begg (1978) defines an estuary as that part of a river system where it enters the sea and where there is, as a result, a slow and steady transition in the physical, chemical and biological characteristics from fresh water to salt water, or alternatively, the point up to where the tidal influence is noticeable. This northern hemisphere definition however, does not work for South African estuaries which, as a result of climatic conditions and topography, tend to close off from the sea at intervals (Demetriades, undated).

At the Rio Summit in June 1992 (CSIR, 1992; cited in Demetriades, undated), the inadequacies of previous definitions of estuaries were recognised. The following definition was proposed for the South Africa situation - that portion of a river system

which has (or can, from time to time), have contact with the sea. Hence, during floods, an estuary can become a river mouth with no sea entering the formerly estuarine area. Conversely, when there is little or no fluvial input, an estuary can be isolated from the sea by a sandbar and become a lagoon (which may be fresh, or hypersaline or even completely dry). The value of direct and indirect benefits that estuaries provide are endless. Some of these are shown in the table below.

Table 2.1 Benefits of estuaries (Breen & McKenzie, 2001)

Examples of ecosystem goods & services	**Examples**
Refugia and migratory corridors	Fish and crustacean nurseries & roosts for migratory birds
Disturbance regulation	Flood control, drought recovery and refuges from natural and human induced catastrophic events (eg. oil spills)
Water supply and regulation	Water supply to marine environment and water for mariculture
Sediment supply and regulation	Creation and maintenance of beaches, sand bars & sand banks
Erosion control & mangroves	Prevention of soil loss by estuary vegetation, & by capturing soil in reedbeds
Soil formation	Accumulation of sediment & organic material on floodplains and in mangroves
Nutrient supply & cycling	Nutrient supply, nitrogen fixation and nutrient cycling through food chains
Waste treatment	Breaking down of waste & detoxifying pollution
Food & bait production	Production (natural & cultivated) of fish, crustaceans and worms.
Raw materials	Harvesting of craftwork & house-building materials
Genetic resources	Genes for mariculture, ornamental species & fibre
Nature appreciation	Providing access to estuaries and associated wildlife for viewing & walking
Sport fishing	Estuary flyfishing, estuary & inshore conventional fishing
Water sports	Swimming, sailing, canoeing, fishing, jetskiing and kayaking
Scenic views	Residential houses, flats & offices with scenic views
Transport services	Marinas, harbours & skiboat launching
Cultural	Aesthetic, educational, research, spiritual, intrinsic & scientific values

Estuaries are characterised by a dynamic mixture of salt, fresh water and sediments (derived from the sea, rivers and land). Estuarine sediment typically consists of mud, sand, and hard or soft substrates. The substrata of South Africa's estuaries are soft sediments – while coarser grained sediments are found at the mouth and upper reaches, finer grained material are found in the middle of estuaries (Glavovic, 2000a).

Sediments are important for plants and animals because they affect factors such as water supply, oxygen and nutrients, and the general stability of the system.

Many studies of the distribution and abundance of plants and animals in estuaries show that the number of species within estuaries is smaller than the number of species within either the sea or fresh water alone (Boaden & Seed, 1985). However, the estuarine environment is characterised by high biological productivity, with relatively low species diversity (Glavovic, 2000a).

Estuarine organisms face special and difficult conditions. The salinity gradient (transition from fresh to salt water) is particularly important and results in gradation of biological community structure from freshwater dominated to marine dominated elements as one moves from the river towards the sea (Glavovic, 2000a). Estuaries tend to have fewer seaweed species and are dominated by flowering plants, reeds and mangroves. Many estuarine organisms eg. prawns, crabs, snails and worms avoid the worst rigours of salinity changes either by burrowing into the sediment or migrating (Boaden & Seed, 1985).

The estuarine food web is dependent on energy from the sun and the transport of nutrients and detritus (decayed plant and animal matter). Detritus is a rich food source for primary consumers, which are usually found on the bottom of the estuary. These are fed upon by small carnivores, which are in turn fed upon by large carnivores, including man (Boaden & Seed, 1985).

Man is a major factor in estuarine change. Impacts caused by humans are extensive and it is only possible to deal briefly with a few of them here.

The release of untreated *sewage* into estuaries is a chronic problem worldwide. The bacterial and micro-organic content of most sewage has a high biochemical oxygen demand, that is likely to cause local depletion of oxygen, thus depriving other consumers, and can result in mass-mortalities through suffocation (Little & Kitching, 1996). Enrichment by nutrients (nitrates and phosphates) in raw sewage, results in eutrophication – promoting short-term algal blooms and longer-term changes in species composition, diversity and abundance (Little & Kitching, 1996). Furthermore, unpleasant odours and presence of faecal matter may lead to abandonment of estuaries as recreational sites. Although this last problem is probably the least serious, it results in the fastest reaction from the authorities (Carter 1988).

Land reclamation for agriculture and development, *coastal structures, dams, harbours* and *marinas* are other aspects of human encroachment into estuaries. Collectively, they result in changes to the physical form, water quality and ecological structure and functioning of estuaries.

Although *dredging* imitates natural scouring, it is a disruptive process as it attempts to maintain conditions that are inconsistent with the processes shaping estuarine structure and functioning (Breen & McKenzie, 2001). Problems relate to impacts on sites where material is removed and where the spoil is deposited. Usually, the coarse material is removed, leaving behind fine material which is unsuitable for benthic

organisms. Disposal of material on adjacent land leads to salinisation of soil or soil poisoning, which affects flora at the disposal site (Breen & McKenzie, 2001).

Artificial *breaching* of estuary mouths, is often carried out by the public (without authorisation), as a result of flooding of low-lying agricultural areas. Sometimes breaching is done to release polluted water – enclosed sewage contaminated water builds up toxic conditions that result in massive fish kills. Artificial breeching may result in sudden lowering of water in estuaries, hence dramatically affecting fauna and flora (Breen & McKenzie, 2001).

Finally, *excessive harvesting* of estuarine organisms for subsistence, recreational and commercial purposes have adverse effects on estuarine biodiversity.

2.3.5 Biodiversity Management

The issue of biodiversity is climbing up the political agendas as, witnessed by the Biodiversity Convention (Myers, cited in Mace *et al.*, 1998). South Africa is party to a number of international conventions and agreements relating to protected areas and nature conservation – the Convention on Biological Diversity, Convention on Wetlands (RAMSAR), Convention on Migratory Species, the World Heritage Convention and UNESCO's Man and the Biosphere Programme (Cowan *et al.*, 2003). Yet, efforts at conservation remain short of what is required.

The principle approach to biodiversity conservation has, hitherto, comprised protected areas – strictly controlled and preventing access to large portions of the populations

that depended directly on the resources. In most parts of the world and in South Africa in particular, these protected areas were driven more by socio-economic and political issues than the achievement of explicit conservation (Pressey, 1994, cited in Cowan *et al.,* 2003). Resistance to these forms of protected areas, and the herald of 'sustainable development', have clearly demonstrated that they have outlived their purpose. Conservation has since come to encapsulate three essential ingredients: conservation of biodiversity, sustainable use of its components, and the equitable sharing of the benefits (Article 1 of Rio Biodiversity Treaty, cited in Jeffries, 1997).

The White Paper has set out the following objectives for coastal protected areas (CPA): integrating protected areas across the land-sea interface, establishing a representative system of CPAs through a combination of ownership and management arrangements and the rehabilitation of damaged ecological sites.

Another critical avenue of biodiversity conservation relates to human-dominated habitats beyond protected areas. This appears to be the direction in which biodiversity concerns are heading. In many parts of the world, protected areas are unlikely to cover more than 5% of the land, and if this unprotected landscape is hostile, and if reserves are randomly distributed, then predictions are that 95% loss of habitat will occur, thereby leading to the extinction of around 50% of all species (Myer & Pimm, cited in Mace, *et* al., 1988),.

The coastal zone, with its increasing demand as an economic and recreational resource by a rapidly increasing population, can be considered such a hostile environment. This has resulted in a need for a Coastal Zone Management Plan

(CZMP), which recognises ecological principles (McClintock, 1990). The objective of CZMP is to devise a framework within which humans can live in harmony with nature, or in current terminology, to provide 'sustainable utilisation' of coastal resources (Carter, 1988).

Coastal management can be divided into three categories: policy (administrative work through legislation and education), planning (prioritising and allocating resources) and practice. Many management decisions are also founded on consensus or bargaining and, as such, may have little to do with environmental paradigms but a lot to do with political expediency (Carter 1988). Jeffries (1997) concurs, by suggesting that management can also create environmental threats by imparting a false sense of security and providing symbols of success which attract increased pressure from tourists, poachers, local people and industry, all keen to exploit resources.

Jeffries (1997) argues that the inclusion of the true value of biodiversity in economic mechanisms, provide a very powerful tool for conservation. Barnes (cited in Sloep & Blowers, 1996) maintains that, in order to protect biological resources in the future, existing emphasis on the short-term trade value of biodiversity needs to change quickly and fundamentally. The White Paper recognises the estimated direct value of the coast as R168 billion annually, while the indirect benefits amount to some R134 billion annually. While aesthetic, educational, cultural, scientific and spiritual benefits are mentioned, no value is attached to these. This is termed the non-use value ie. the amount one is willing to pay to conserve.

The White Paper focuses on community –based natural resource management, or local demonstration projects to provide examples of success that ICZM can have in achieving sustainable coastal development at the local level (these projects will initially be operated with the assistance of donor funding).

The definition of 'local' and 'community' is problematic, especially in the South African context, where it is frequently used to refer specifically to historically disadvantaged groups of people (Glavovic, 2000a). The government may be emphasising focus on 'local' allied with sustainable development, while local capital projects (with their 'business-as-usual' *modus operandi*) continue to create negative environmental impacts (deemed essential for economic growth). In this case, sustainable development runs the risk of taking on a new definition: that which prevents the poor from damaging the environment, only so the rich and powerful can exploit the same environment on a grander, more technologically advanced scale! At its crudest it may pay local communities to cut down forests and put the money into capital projects or even the bank (Jeffries, 1997).

2.4 Tourism

2.4.1 Overview of the Tourism Sector

Since world war two, tourism has witnessed phenomenal growth, and has become one of the world's massive industries. It currently ranks alongside petroleum and motor vehicles among the leading branches of world commerce (World Trade Organisation, 1990, cited in German Federal Agency for Nature Conservation, 1997). In 1990,

tourism amounted to 12% of the gross global product and 15% of global turnover in the service sector (World Trade Organisation, 1994, cited in German Federal Agency for Nature Conservation, 1997). Tourism is also a huge employer. Tourism is responsible for approximately 12, 3 % of the world's total consumer spending and the industry creates jobs for 6.5% of the world's workforce (Miller, 1993; cited in French, 1997).

Although most of the focus associated with international tourism takes place between developed countries, more and more Europeans, North Americans and Japanese have been travelling further afield to various parts of the third world – the Caribbean, Eastern Mediterranean, South East Asia, the Pacific Islands and Africa (Ioannides, 1995). Indeed, Middleton (1996) concurs by denoting a phenomenon of growth ceilings in international tourism from existing major markets in developed countries (a ceiling represents a level of activity reaching market saturation at a point in time). Edwards (1992; cited in Middleton, 1996) predicts such ceilings being reached in several developed countries by 2005, with demand and supply switching to new growth areas, notably the developing countries. Coincidentally, it warrants attention that global expansion of tourism is being concentrated more and more in areas whose species and habitat diversity are particularly significant ie. the developing world (Pearce, 1989; cited in Ioannides, 1995).

The German Federal Agency for Nature Conservation (1997) maintains that while coastal tourism will probably remain the mainstay of global tourism, nature and cultural tourism will take on greater significance as a result of the demand becoming increasingly specialised. Assessing tourism's environmental impacts is therefore

imperative, considering that the sector's success usually depends on fragile ecosystems such as beaches, tropical forests and estuaries. Hunter & Green (1995) argue that not only are the fastest rates of growth in tourism taking place in developing countries, but that there has also been a shift from traditional mass tourism associated with passive pursuits - sandy beaches, swimming, public entertainment and catered accommodation – to a de-massed, heterogenous society. In the last 50 years, growing populations with car ownership as the norm, and increasing affluence and leisure time, have brought a new dimension to society's expectations of, demands upon and use of the coast (Goodhead & Johnson, 1996).

These expectations reflect a shift in emphasis to focus of interests on *forms* of tourism – golfing, nature-based, cultural, ecotourism and casinos. These demands have to be met in exotic and sophisticated ways. Middleton (1996), cautions that the search for such products are likely to be satisfied in environmentally fragile areas (which are least able to cope with tourist impacts), and that this form of tourism will be more expensive to promote. This focus on *forms* of tourism is, to an extent, a reflection of the expectations of the emerging tourist – a more discerning, older, more affluent and better educated tourist (Middleton, 1996).

Tourism, the new "buzzword" is being rapidly pursued by governments around the world as a fast track solution to economic generation, employment creation, improving standards of living, and as a means of securing foreign exchange. It is, therefore, not surprising that tourism commands a high place on the agendas of many developing countries.

There are several reasons as to why tourism is the preferred alternative to industrialisation, which dominated the development scene in the twentieth century. Tourism requires low capital investment, especially if integrated with existing infrastructure and settlement; it requires lower technological and labour skills; and it faces less protectionism in the world markets than manufacturing (Shaw & Williams, 1994; cited in Ioannides, 1995). Middleton (1996) adds a further dimension – because tourism is not the traditional smokestack industry with the obvious pollution potential of manufacturing, extractive industry or agriculture, it has not, so far, been closely examined for its full environmental impact. This places tourism in a slippery position, which has produced opportunities for lobbies to further their own agendas in promoting tourism (Ioannides, 1995).

2.4.2 Tourism Trends

In the future, there will be more demand for enclosed (gated) tourism complexes for example Sun International resorts, timeshare resorts and holiday villages which will shield the visitor from any negative social and ecological conditions in the host country (Middleton, 1996). These are more likely to offer appealing holiday facilities and activities that customers seek. Furthermore, because they are planned and centrally controlled, they have the potential to minimise environmental damage (Ioannides, 1995; Middleton, 1996; German Federal Agency for Nature Conservation, 1997). Moreover, the effective use of landscaping that is so characteristic of these 'enclosures' can play a role in promoting biodiversity.

The World Trade Organisation (WTO) (1994, cited in German Federal Agency for Nature Conservation, 1997) predicts that many tourists will, more frequently, take several short holidays instead of a few trips. This will exert pressure on infrastructure. The expansion of existing airports or the creation of new ones is an especially significant aspect of infrastructure provision. Middleton (1996) stresses the following important aspects about the air transport industry that warrant consideration: first, they have to project growth to secure government provision of infrastructure, which questions the validity of their growth projections; second, air transport serves only a part of international tourism, and is less important to domestic tourism. Furthermore, tourism is a fickle industry which has the means to switch destinations for any number of reasons – political unrest, outbreaks of epidemics, threat of terrorism, environmental damage, and so forth. It is, therefore, imperative that the construction of airports be based on the identification of need and not a whim.

Tourism has been linked with causing inflation in areas, especially in property and housing. This is evident in some coastal parts of Cyprus, where the rate of increases in land prices, annually, have far exceeded the inflation rate (Ioannides, 1995). As a result, the vast majority of people can simply no longer afford to buy land.

The general lack of zoning ordinances, especially in the developing world, has also led to speculative development as developers scramble to 'make the proverbial fast tourism buck' (Leontidou, 1988; cited in Ioannides, 1995). The result - tourist facilities may be badly planned, places stress on infrastructure and the environment, and the lack of overall development plans means that the collective needs of a society cannot be met (Ioannides, 1995).

2.4.3 Tourism Development and the Environment

Most studies indicate that more severe impacts of coastal tourism on the environment stem from the infrastructure and the development activity it entails rather than from the recreational activities themselves (German Federal Agency for Nature Conservation, 1997).

The leisure industry worldwide has the greatest impact on the coast – estuaries, wetlands and dunes. While environmental change is an unavoidable consequence of the growth in coastal tourism, its impacts tend to differ from that of other developments such as residential – the latter deals with a somewhat fixed population, while tourism deals largely with a transitory population whose intensity and numbers per unit area are higher (French, 1997). Hence, this change needs to be maintained within acceptable environmental limits, in order to sustain the tourism industry.

Environmental deterioration threatens the industry in many ways – biodiversity reduction, resource depletion, habitat loss, and human health problems.The most serious impact of tourism on the environment worldwide is the decline in water quality and destruction of biodiversity from sewage contamination (Clark, 1995).

Clark (1995) argues that the greatest threat to estuaries and wetlands arise from construction and reclamation activities. The construction of marinas is a development activity that is significantly on the increase. Marinas are constructed to provide a lifestyle that is closely related to water – typically estuaries. Marina development took off in the mid-1970s culminating in a frenzy of activity in the late 1980s, when

developers realised that housing and entertainment facilities were essential for any marina scheme to be viable (Goodhead & Johnson, 1996). They view the success of developing residential housing and entertainment within a marina as a trend which will be very much a function of current property markets (Goodhead & Johnson, 1996). Marinas will place immense burdens on estuaries and its biodiversity.

The requirement for association with water is met by developing canals through low-lying parts of estuaries, for example wetlands. Construction is secured from erosion and flooding by stabilising canals with bulkheads and by using spoil to elevate stands (Breen & McKenzie, 2001). Canals result in the following impacts: they alter the shallow water component of estuaries (a habitat suitable for macroalgae, rooted plants and small animals), they increase the tidal prism thereby flushing and enhancing removal of marine sediment at the mouth, they alter the natural patterns of erosion and sedimentation, and the hydraulic resistance in canals can restrict flushing thereby causing stagnant water conditions (Breen & McKenzie, 2001). Domestic refuse and sewer contamination are also a problem.

Land is sometimes reclaimed from wetlands, in order to add to the total stock of land for development, especially if there is a shortage due to intensive competition for space. The effects of land reclamation are: modifications to ebb and flood tide currents, hence directing stronger currents onto the beach, resulting in increased erosion (Towle, 1985; cited in French, 1997); increasing incidence of flood damage to property, privitisation of a public asset (Breen & McKenzie, 2001); and the removal of vegetation which is the main habitat component to biota (Cox & Goodman; cited in Goodman, 2000).

Another tourist trend worldwide is golf. Golf courses require large quantities of water, fertilizers and pesticides to protect the generally non-indigenous grasses from prevailing environmental influences (German Federal Agency for Nature Conservation, 1997). In the coastal context, golf is sometimes conducted in sensitive dunes, causing stress to the system.

There is also an increasing tendency for leisure time to be spent on off-road vehicles (ORV). Their effects on dunes and beaches cause the reduction in vegetation cover. o Liddle (1973; cited in French, 1997), states that approximately 200 vehicle passes are sufficient enough to diminish ground cover by 50% in summer and by more in winter. The effect of tyre damage is also long-lasting, meaning that sand is exposed to wind and subsequent erosion for longer periods of time (French, 1997).

2.4.4 Management Issues

While environmental interests are obvious and widely proclaimed, the delivery of truly sustainable products require controls and regulations which do not easily blend with entrepreneurial activities (Middleton, 1996). In the search to sustain environmental quality commensurate with growth, 'sustainable tourism' has been advocated – a highly contested term, meaning different things to different stakeholders, and certainly not a shared concern. Ioannides (1995) argues that an important reason behind the failure to promote more efficient policies for tourism's growth is the debate surrounding the notion of sustainable tourism.

Many critics of sustainable tourism argue that it views the industry purely from a demand side perspective. Owens (cited in Eden, 2000) argues that governments attach undue importance to fulfilling the 'need' (demand), rather than seek to curb it, because demand management, whilst essential for sustainable development, is at the same time politically unpalatable. Traditionally, governments of most developing countries have defined sustainability in tourism in terms of maintaining the levels of tourist arrivals and receipts (Ioannides, 1995). Gunn (1994) argues that, it is the lack of appropriate policies to cope with any kind of growth, and not the volumes of tourists per se, who cause most environmental damage.

While compliance measures may exist within local authorities, many lack the capacity to carry them out. On the other side of the coin, tourism and its associated development generates huge revenue for local authorities. Holloway (1994) suggests that if local authorities refused planning permission over tourist development, this would be unlikely to deter the influx of tourists if it is a popular destination or private sector promotion may frustrate attempts at government compliance efforts, and there is also the danger that if public sector strategy is successful, tourism may suffer a downturn (Holloway, 1994).

Ioannides (1995) argues that despite the existence of ample rhetoric in the 'dos and don'ts of tourism development, policy makers in the third world repeat the same mistakes. Only when limits have been exceeded and negative impacts are glaring, are governments forced to take action – when it may be too late. One may say that governments well understand the concept of 'unsustainable', but have no idea what 'sustainable' means. Cullinan (2001) maintains that sustainable development, as it is

currently used and conceptualised has become meaningless in advocating the environmental agenda. In order to avert tourism's negative impacts, the time has come to remove the sector from its peripheral position and place it within a broader development dialogue (Pearce, 1989, Shaw & Williams, 1994; cited in Ioannides, 1995).

2.5 Land Use/Cover Change

Foremost, the distinction between two inherently interconnected and interchangeable aspects related to land, need to be defined – 'land use' and 'land cover'. Many concur that there is no standard, universally accepted set of categories for classifying land either by use or cover, and the most commonly used classification are hybrids of land cover and land use (Anderson *et al.*, 1976; Meyer, 1995; cited in Yemane, 2003).

Clawson & Stewart (1965; cited in Rhind & Hudson, 1980) define land use as man's activities on or man's use of land which is directly related to the land. Yet, there has been considerable interest, especially in the rural areas in what may be termed 'land cover'. According to Burley (1961; cited in Rhind & Hudson, 1980), land cover can be defined as the vegetation and artificial constructions covering the surface of the land. Because land cover is changed mostly by human use, an understanding of land use change is essential to understanding land cover change (Bibby & Shepherd, 1999; cited in Yemane, 2003). Hence the interdependence between classifying land either by use or by cover. For this reason, the hybrid of both use/cover will be used in this dissertation.

It is generally accepted that land is a basic and precious natural resource. The fact that many battles and wars have been fought over it bears testament to this. Of course, the value of land is fundamentally linked with the natural resources it supports. We all need land on which to live, however, the use of a particular piece of land affects not only those who live on it, but also those living adjacent to and surrounding it (Rhind & Hudson, 1980). Land can be seen as a container of human communities, their activities, and as a record of evolving patterns of life (Kivell, 1993).

Land also has political connotations – it is the key to planning and control by governments and other institutions (Kivell, 1993). Smith (1976; cited in Christopher, 1982) states that Apartheid was a distinctively spatial planning strategy, an exercise which aimed at the spatial reorganisation of society according to race.

Finally, since humans are large consumers of resources, land is also related to environmental issues (Kivell, 1993).

2.5.1 Factors Driving Urban Land Use/Cover Change

The growth and evolution of urban areas is always accompanied by land use/cover changes. Some of the most significant factors driving such change are:

Population growth is one of the most anticipated reasons for land use/cover change – more people consume more land. Kivell (1993), maintains that even in the absence of crude population growth, additional demands for housing can be generated by social and demographic changes – divorce, changing marriage patterns and an ageing

population, all of which contribute to a reduction in the average family size and a higher number of separate households.

Rising personal affluence is on the increase, and coupled with that is the rise in consumption patterns. In most western societies where the basic needs of life have already been amply provided for, the effect of growing affluence has been to further boost the consumption of land (Kivell, 1993). According to Goodhead & Johnson (1996), in the last 50 years, a growing population with car ownership as the norm, coupled with increasing affluence and leisure time, have brought new dimensions to society's expectations of, demands upon and use of land. For instance, many consumer surveys indicate strong preferences for decentralised, low density suburban living (Gordon & Richardson, 1997).

This decentralisation property "boom" has been facilitated by the increasing availability of finance, partly from personal affluence, but also from property investment by institutions such as pension funds, investment and insurance companies who are particularly attracted to land and property development in the commercial sector – hotels, offices, retail and leisure (Kivell, 1993).

Transport and communication changes present another major variable that accounts for the continuing demand for urban land. Kivell (1993) states that each successive phase of transport has brought with it widespread changes in locational advantages and disadvantages, as well as detailed changes in localised urban land uses. Webber (1993; cited in Gordon & Richardson, 1997), argues that for the most part of the twentieth century, the highway system has been a major force driving low-density

suburbanisation, as the barriers of distance continue to dissolve. Indeed, Kivell (1993) concurs that the motor vehicle has been the single most important force shaping land use change - creating suburbs on a scale never before possible, rewritten the rules of urban accessibility, thinned out the overall density of urban development and revolutionised the location of jobs, shops and leisure activities.

Furthermore, major nodes along these highways provide ideal opportunities for office parks, retail complexes and high technology industrial estates. Large parks tend to have on-site amenities – banks, shops, pubs, sport facilities etc. Landscaping, architecture, site density and parking are features of such estates. Harvey (1987) states that these estates could further develop into places where people live as well as work. The creation of suburbs, which cater for almost all needs, making trips into the traditional central business district (CBD) no longer necessary, and commuting is now suburb-to-suburb, with a decrease in suburb-to-central city commuting.

Chronologically, the most recent transport development is that of air transport. Airports themselves act as catalysts for land use change and urban growth, in the form of large scale commercial and retail developments, industry and extensive road and rail development.

In addition to the decentralisation brought about by transport, communication changes are also shaping urban areas. Gordon & Richardson (1997) maintain that the centrifugal trends have now accelerated because telecommunication access is no longer determined in terms of geographical distance and hence, proximity is becoming redundant.

2.5.2 Impact of land Use/Cover Change

The rate at which urban land is being converted often gives rise to concern. One such concern is the conversion of agricultural land to other uses. There are arguments that suggest that agricultural land be preserved to ensure future food security, in light of rising populations. However, this argument is weak. Sen (1994, cited in Gordon & Richardson, 1997) argue that world food production per capita has increased in the past decade, and only in Africa did food production per capita decline (by 6%). This was due primarily to structural development problems rather than an essential shortage of fertile land.

Furthermore, property development and recently, tourism, are more lucrative than agriculture, so from an economic perspective, it makes better sense to convert agricultural land. On the same point, Gordon & Richardson (1997), state that policies to contain cities in order to preserve suburban farmlands force land into lower valued uses.

Land use change often results in sprawl. Originally, the term sprawl was used to describe predominantly commercial 'ribbon' development that occurred along highways and over considerable distances, but has hitherto been extended to include any kind of low-density suburban development (Altshuler & Gomez-Ibanez, 1993; cited in Gordon & Richardson, 1997). Ribbon development, based on the presumption of infinite space, focuses on linear stretches of development and has been criticised for resulting in serious ecological, social and economic consequences (Glavovic, 2000a). In coastal areas, waterfront development is in huge demand. This demand

which responds to the essential needs for economic growth, leads to a linear approach to coastal development focussing on sensitive land along the water's edge – wetlands, dunes, land with beach access or land which commands exceptional views (Clark, 1995). This type of development places extreme pressures on the natural systems.

Traditional methods to contain sprawl resulted in the declaration of green belts, which came into prominence in the 1930s (Harvey, 1987). Green belts provided a pleasant environmental backdrop for the development of new towns. However, criticism of green belts have occurred for the following reasons: they add to the problem of congestion by forcing development within existing urban centres, they fail to prevent development encroaching into them, commuting across green belts reduces the efficiency of transport systems and is time-consuming, and green belts have contributed to spiralling increases in land values (Harvey, 1987).

Finally, while land use changes are motivated by the desire to improve land for human use or pleasure, degradation may nonetheless occur (Yemane, 2003). According to Haines-Young, *et al.,* (1994), there are massive transformations in the natural and semi-natural vegetation cover of the earth on a global scale. From an ecological perspective, vegetation and forests provide a host of essential functions – greenhouse gas regulation, maintain species diversity, regulate water supply, control erosion, etc. Changing cover also results in changes in rainfall infiltration and runoff rates – decreasing infiltration and increasing runoff. Clearing vegetation also exposes the soil to erosion.

Thus, the rate of urban land use/cover change has raised serious concerns about limiting growth in order to maintain environmental and social qualities of life.

2.5.3 Land Ownership

In recent years, empirical studies of the motives and behaviour of landowners, be it public or private, have helped enlighten theoretical understandings of the processes of land supply for development (Adams & May, 1991; Kivell, 1993). Land ownership has important implications for land development.

Firstly, the size and configuration of land holdings affect urban morphology. The layout and scale of urban development owes much to the nature and extent of original land ownership boundaries (Conzen, 1960; Ward, 1962; Dyos, 1968; Mortimore, 1969; cited in Adams & May, 1991).

Secondly, the timing of land sales affects the nature of urban development. In particular, this may reflect the contemporary technology and economic driving forces together with architectural and planning styles (Kivell, 1993).

Thirdly, land ownership bestows power, especially with those having extensive land owning interests. This is a major feature of the past, mainly concentrated in the hands of economic and political leaders. However, millions of households in most western countries have gained considerable financial power over land ownership (Kivell, 1993). This means that landowners may exert considerable influence over urban planning policies, especially if they act in concert (Cox, 1984; cited in Kivell, 1993).

This comes about through their decisions on whether, or when, to sell land and participate in different kinds of development.

Adams & May (1991) identified a distinction between active and passive land ownership, and the way they influence development. Landowners are considered active if they either, develop their own land, enter into joint ventures, or market their land for others to develop; while passive landowners may respond to offers from potential developers, but would rather hold onto land without development (Adams & May, 1991).

Fifthly, ownership is an essential part of the relationship between the production and consumption sectors, and hence an important part of national and local economies. The production sector (developers and speculators) view land as a commodity and their main interest is to maximise the exchange value of land; while the consumption sector is interested in maximising the land's use value eg. farmers.

2.5.4 Market Forces

The price of land is essentially determined by the interaction of supply and demand factors. Furthermore, land prices are determined by the type of land use (Harvey, 1987), and relative location (Hurd, 1903; cited in Rhind & Hudson, 1980).

Demand factors: Generally, land use in a market economy is determined by decisions made by households, firms and others, with regard to general accessibility (transport infrastructure, recreational amenities, shops etc), special accessibility (complementary

for businesses, social status of households), and additional factors (topography, special site characteristics). Each of these activities requires land, and it is generally the activity which can outbid all others that acquires the site (Kivell, 1993).

Demand is divided into – demand from those whose main concern is the value derived from current use of land; and demand from investors wishing to enjoy an increase in land value derived from future expectations (Goodchild & Munton, 1985; cited in Kivell, 1993).

Supply factors: Land was previously considered to be in fixed supply – no more could be created. There are however, important qualifications to this: reclamation adds land to the total stock, intensity of use can increase the effective supply; and the amount of land available can be increased if land owners bring more of it onto the market or if urban development expands into agricultural or other land (Kivell, 1993).

There are however, limits to the supply of land. For instance, planning can either permit or deny development, hence affecting supply. There may be physical constraints on land which prevent development (water bodies, ecologically sensitive areas). Finally, behavioural choices made by landowners may affect the development process eg. the constraints imposed by multiple land ownership, where several different land owners of a particular site may be unable to reach consensus on its future use; or land management and development strategies of individual landowners may (for taxation or other reasons) mitigate against early land release (Adams & May, 1991).

Supply side land prices may be based on comparisons with other adjacent sites, the cost of replacing the current use with an alternative, a reflection of future market prices, or greed (Pearce *et al.*, 1978; cited in Kivell, 1993).

2.5.5 Land Use Management

Land policy is initiated by governments who seek to influence planning, ownership, price and the benefits of land; in conjunction with controlling development, either in the sense of shaping land use patterns, or ensuring a degree of fairness and redistribution of the gains made (Kivell, 1993). Because coastal land is so scarce and often ecologically sensitive, it may require to be used in a different manner from other land. This is significant in order to protect the environment and keep options open for future priority development and resource use (Clark, 1995).

Land use management in general, uses a range of tools to ensure that land use is appropriate and managed. These general management techniques are further refined for the management of development specifically in coastal areas.

2.5.5.1 Zoning and Schemes

Zoning, commonly associated with Town Planning Schemes, is a common tool used in many countries, where specific pieces of land are identified for a particular use, such as residential, commercial, etc. Zoning indicates the rights of a property, the number of floors permitted, building boundary lines, height of buildings and percentage of building coverage. According to Clark (1995), the scarcity of coastal land and its importance to communities, means that coastal land needs to be allocated within a broader social perspective than any other land. This integrated approach

would balance conservation and social equity needs, as well as economic objectives. The coastal zone is also an area of intense private and public-based activities (property, recreation), and zoning needs to seek compatible solutions with all sectors having legitimate interests.

Another aspect of zoning relates to controls on intensities of land use permitted on a property. This has important implications for resort development. Standards such as plot size, building coverage and density imposed by the local authority can be used to reflect directly the type of tourism desired. However, more coastal specific standards are required for coastal resorts because of issues regarding the sensitive nature of the environment – water quality, beaches, sewage disposal, and so forth (Clark, 1995).

2.5.5.2 Rates and Taxes

In order to address equity issues, some municipalities are moving towards a system of market valuation for rates ie. households with beachfront property, sea views etc. aught to pay more taxes because the value of the land is greater as opposed to households that are located further inland (Mather, 2005).

2.5.5.3 Environmental Impact Assessments

Cumulatively, all activities that are occurring in the coastal zone require some form of environmental assessment. In South Africa, the need for environmental assessments and the promotion of sustainable development have both been highlighted through the implementation of Integrated Environmental Management (IEM) and more recently, through the implementation of Sections 21, 22 and 26 of the ECA – the so-called

Environmental Impact Assessment (EIA) regulations (DEAT, 1998b) and the NEMA (de Wit, 2001).

EIA has been subject to a range of definitions, but perhaps the most comprehensive is that it is a process for identifying the likely consequences for the environment (biogeophysical, social and economic), of implementing particular activities, and for conveying this information at a stage when it can subatantially affect their decisions to those responsible for sanctioning proposals (Watern, 1992; cited in Weston, 1997).

O'Beirne & Boer (2001) argue that the assessment of proposed activities on the environment is the 'traditional' purpose of EIA, whereas the promotion of sustainable development is the 'modern' purpose, which became a reality since the Rio Conference in1992 and the subsequent release of Agenda 21. However, many critics argue that while there has been a philosophical change, there has not been a commensurate change in EIA practice (O'Beirne & Boer, 2001, de Wit, 2001, Cullinan, 2001). Furthermore, O'Beirne & Boer (2001) argue that EIA is an imperfect mechanism for advancing sustainable development, but the response to those imperfections has simply been a plethora of new processes – SEA, SIA – to name a few.

There are many reasons why EIA fall short of meeting the requirement of sustainable development – they have been criticised for applying least possible effort to satisfy minimum regulatory requirements ('rubber stamping' process) and lack of mitigation and follow-up implementation (Pero, 2001).

According to Cullinan (2001), romanticised views that offer holistic notions of a harmonious balance between people, nature and society are limited in applicability in a modern context. de Wit (2001) concurs by emphasising the reality that trade-offs exist between the pillars of sustainable development – ecological, socio-cultural and economic – and these are not explicit, thereby leaving room for arbitrary and politically motivated decisions. Cullinan (2001) maintains that these conflicts are going to increase in the years ahead, especially since we are operating in a society which values consumption and measures economic growth in ways that discount natural resources.

Despite South Africa's extensive environmental legislation, it lacks the capacity and the institutions to implement EIA regulations (de Wit, 2001). This is more apparent in EIA follow-ups. Cubitt & Diab (2001) state that, at present, EIA follow-up is not a mandatory step in the EIA process and this is reflected in poor or non-existent coverage in legislation. IEM guidelines identify compliance, monitoring and auditing as vital components of the EIA implementation stage, however, they are not legally binding and hence leave the issue of follow-up to be undertaken voluntarily (Cubitt & Diab, 2001). The issue of follow-up is neglected in the ECA, and the NEMA provides only a partial monitoring and management of impacts. The lack of EIA follow-up in KwaZulu - Natal is attributed to financial constraints, lack of capacity, inadequate legislation and general lack of enforcement (Cubitt & Diab, 2001).

The process of consultation and public participation is a crucial part of EIA and is enshrined in the ECA, NEMA, and the Constitution. However, developers sometimes limit themselves to minimal public involvement in order to meet legal requirements

and time and budgetary constraints (Madonsela & Ramasar, 2001). Weston (1997) maintains that the public are seen as the 'enemy', not simply by developers, but also by local authorities. Although they should be operating in the public interest, the public do not always understand the constraints under which authorities work.

The Environmental Management Plan (EMP) is a crucial tool for facilitating practical environmental guidance in the construction phase of the project, thereby ensuring that avoidable and unnecessary environmental impacts are kept to a minimum (Parkes, *et al.*, 2001). The EMP is aimed at the engineer, contractor and developer. EMPs in South Africa are plagued by vagueness, lack of enforceability and failure to take due consideration of externalities and hence becomes a neglected tool in environmental management (Parkes *et al.*, 2001). As a result, most EIAs fall short in documenting and implementing practical environmental management and mitigation measures (Barnard, 2001).

2.5.5.4 Setbacks

A key component of CZM is a provision whereby coastal development is prohibited in a protected zone adjacent to the water's edge – known as 'setback'. The objectives of such setback zones are to minimise the disruption of dynamic coastal processes (and their impact on development), to avoid exposure to significant risk from natural hazards (flooding, erosion and the predicted SLR) (DEAT, 1998a) and to protect important features like dunes and estuaries. The types of setbacks include: erosion and flood lines, greenbelts, and setbacks that keep septic tanks at a safe distance from water sources to avoid leaching and their subsequent contamination (Clark, 1995).

Presently in South Africa, there exists no appropriate mechanism for the implementation of a development setback line of the HWM. The KwaZulu – Natal Department of Agriculture and Environmental Affairs (DAEA) Draft KwaZulu – Natal Coastal Management Policy (2004) sets the following setbacks (buffer zones): areas falling outside the definition of coastal private property and fall within the following categories: declared sensitive coastal areas, coastal protected areas, portions of the Admiralty Reserve not owned by the state, zoned land within 100m of the HWM, any un–zoned land falling within 1km from the inland boundary of coastal public property (coastal waters, seashore, state-owned Admiralty Reserve, designated state-owned land and harbours). The CSIR has conducted scientific assessments and set coastal erosion lines at 46m above HWM.

2.5.5.5 Sensitive Coastal Areas

One of the key objectives of coastal management is to promote desirable development, which is in keeping with critical natural environmental features as well as important ecological processes (DEAT, 1998d). However, currently, no legislation exists which provides for the control of the manner or form in which development takes place (DEAT, 1998c). Because of the absence of formal control, inappropriate development has taken place and has had negative impacts in Sensitive Coastal Areas (SCA). The need to identify specific SCAs was therefore recognised. The ECA makes provision for such areas. In order to distinguish SCA regulations from other national initiatives that control certain activities, the areas along the coast where activities are controlled, are specifically referred to as SCAs (DEAT, 1998c).

The aims of controlling activities within the SCAs are:

- to control activities in preparation which are not controlled by other existing legislation and which are not subject to an environmental assessment, which are likely to adversely impact on the environment. Such activities are: disturbance of vegetation, earthworks, dredging and dune stabilisation;
- to guide, and not necessarily prohibit, development;
- ensure environmental mitigation measures;
- ensure proper rehabilitation of disturbed areas after construction; and
- prohibit unacceptable impact on the coastal zone

SCA regulations are generally aimed at controlling small-scale activities at individual plot level. SCAs include all undeveloped land in the following areas: geotechnically unstable areas (cliffs and steep slopes); water bodies, their courses and their banks; beaches, dunes and rocky shores; and important vegetation communities. SCA regulations stipulate that the controlled activities mentioned, require an environmental impact report. Decision-making regarding permit allocation is usually undertaken by the local authority.

2.5.5.6 Use of Vehicles in the Coastal Zone

In December 2001, the Minister of Environmental Affairs & Tourism published regulations prohibiting the use of vehicles in South Africa's coastal zone. However, Regulation 4 (DEAT, 2001) allows for the use of vehicles in the coastal zone in the following circumstances:

- recreational use areas (RUA) designated by the Director General;
- authorisation of vehicles in the zone in certain non-recreational circumstances and when the prescribed requirements had been complied with (eg. vehicles to

access boat launch sites, film-making, emergency vehicles, mining, the use of electrically propelled vehicles for the physically disabled, for a tourism business, and for research);

- provided specific measures to enforce the regulations; and
- prescribed penalties for contraventions

However, amendments circulated in 2004 proposed the removal of designated RUAs, which had largely been identified in KwaZulu- Natal. Initially, legislation had allowed for the designation of RUAs providing that it will not cause in any significant harm to the environment, nor seriously affect the rights of the general public to enjoy the coast (Tourism KwaZulu -Natal, 2004).

Tourism KwaZulu - Natal conducted surveys in the tourism and accommodation sectors to assess impacts of the legislation and found the following: increased unemployment, bankruptcy, increased crime on beaches and decreased profits for tourism-related businesses (Tourism KwaZulu -Natal, 2004). Although the use of vehicles on beaches cannot be identified as the sole cause, it has been one of the major ones (Tourism KwaZulu- Natal, 2004).

At a Coastal Management Unit meeting (30 September 2004), KwaZulu – Natal's Minister of Arts, Culture and Tourism called for concessions to allow for ORVs in designated RUAs, that local authorities prepare recommendations in this regard, that scientific evidence support the decision for RUAs, and local authorities to suggest sustainable alternatives to inform the Minister of Environmental Affairs and Tourism.

Subsequently, a scientific model developed by the Oceanographic Research Institute was presented to KwaZulu - Natal authorities in early 2005, which indicated that almost 20% of the province's beaches could tolerate vehicles without harm to the environment (Newman, 2005). It also suggests the strict control of vehicles in sensitive areas, and the designation of specific 'no go' areas. The environmental considerations were coupled with social benefits in deciding to reinstate RUAs. The scientific model would have to be considered at a national level.

2.6 Need for the Study

There is widespread consensus that, owing to its unique character, the coastline supports a wide range of land uses that compete with each other of its use.

The study area is the KwaZulu – Natal north coast, stretching from Umhlanga Rocks in the south to Salt Rock in the north. Up until the mid – 1990s this coastline was relatively undeveloped with agriculture (sugar cane) being the dominant land use. The immediate coastal strip was scattered with small towns that were generally low density residential, but also held a resort component. This stretch of coastline adheres to the lifestyle preferences of the higher – income ie. attractive and leisure – based. This strip of land has, in recent years, become a speculator's paradise north of the Umgeni. It has been experiencing unprecedented levels of development (particularly in tourist and residential sectors), and potential for more development appears imminent. Ballito and Salt Rock are parts of the study area reputed to have the fastest growing real estate in South Africa (DEAT, 2004). Much of the development that is occurring in this area is unsympathetic to the environment.

While property development in the area may be considered spectacular, negative impacts have surfaced - various coastal stakeholders have raised concern over the need for control of development which is threatening to engulf the last remnants of coastal forest, the health of estuaries, biodiversity and the aesthetics of this coastline, which are its attraction in the first place (Proceedings of the Ilembe District Coastcare Workshop, 2004).

Jacobs (cited in Attwood, 2004) argues that the positive aspect to the north coast boom is the creation of employment opportunities for local people in both the construction and the service industries.

From an environmental point of view, the changes experienced on this coastline appear short – term and unsustainable, and if allowed to proceed, could result in the destruction of the environment, declining tourism, and ultimately economic collapse. There is, therefore, a need to assess this coastline in order to retain the long - term quality of the environment in tandem with the economic need to invest and develop. It is these concerns that provided the rationale for this investigation.

2.7 Aim of the Study

The aim of this study is to provide a holistic assessment of the impacts of the change in tourist and residential development on biodiversity, land use and tourism on the KwaZulu – Natal north coast from Umhlanga Rocks to Salt Rock, which is an ecologically sensitive portion of the coastline.

4.8 Objectives of the Study

- To determine the type and rate of development taking place on this coastline (Settlement patterns and transport routes, land utilisation and trends and landscape characteristics).
- To investigate the factors driving development on this coastline.
- To determine significant biodiversity/conservation ecosystems.
- To explore the relationship between development and the natural environment.
- To explore the relationship between tourism and the natural environment.
- To determine how the economic returns from development (tourist and residential) can be counterbalanced with environmental management.
- To determine important stakeholders and their value in decision-making regarding the study area.
- To explore the extent/importance accorded to impact mitigation.
- To assess how management can intervene to safeguard the long-term value of this coastline.
- To assess policies applicable to the coastal zone.
- To identify coastal zone problems/management issues within the study area.

CHAPTER THREE: STUDY AREA

3.1 The Study Area

The study area is located on the south east coast of South Africa, within the province of KwaZulu – Natal (Figure 3.1). It is located on the KwaZulu - Natal north coast, stretching from Umhlanga Rocks in the south to Salt Rock in the north, and up to and including the National Road (N2) in the west. The study comprises an area of approximately 5534.05 ha. It falls within the jurisdiction on the eThekwini Municipality (Umhlanga Rocks to Tongaat/Westbrook) and the Ilembe District Municipality (Ballito and Salt Rock).The Tongati River marks the physical boundary between the two municipalities.

3.2 Road Corridors

The most important corridors include the M4 highway, the N2 national road which runs north/south; and various link roads which run east/west, creating a major grid - iron road system. The M4 is situated within a highly sensitive and dynamic marine/terrestrial interface zone.

3.3 Physical Dynamics

The principle physical assets of the area are its favourable climate, topography and geomorphology. These combine to form the foundation of the coast's natural heritage - sandy and rocky shores, coastal forest, wetlands, estuaries and grasslands which support a range of diverse ecosystems for terrestrial and fresh water organisms.

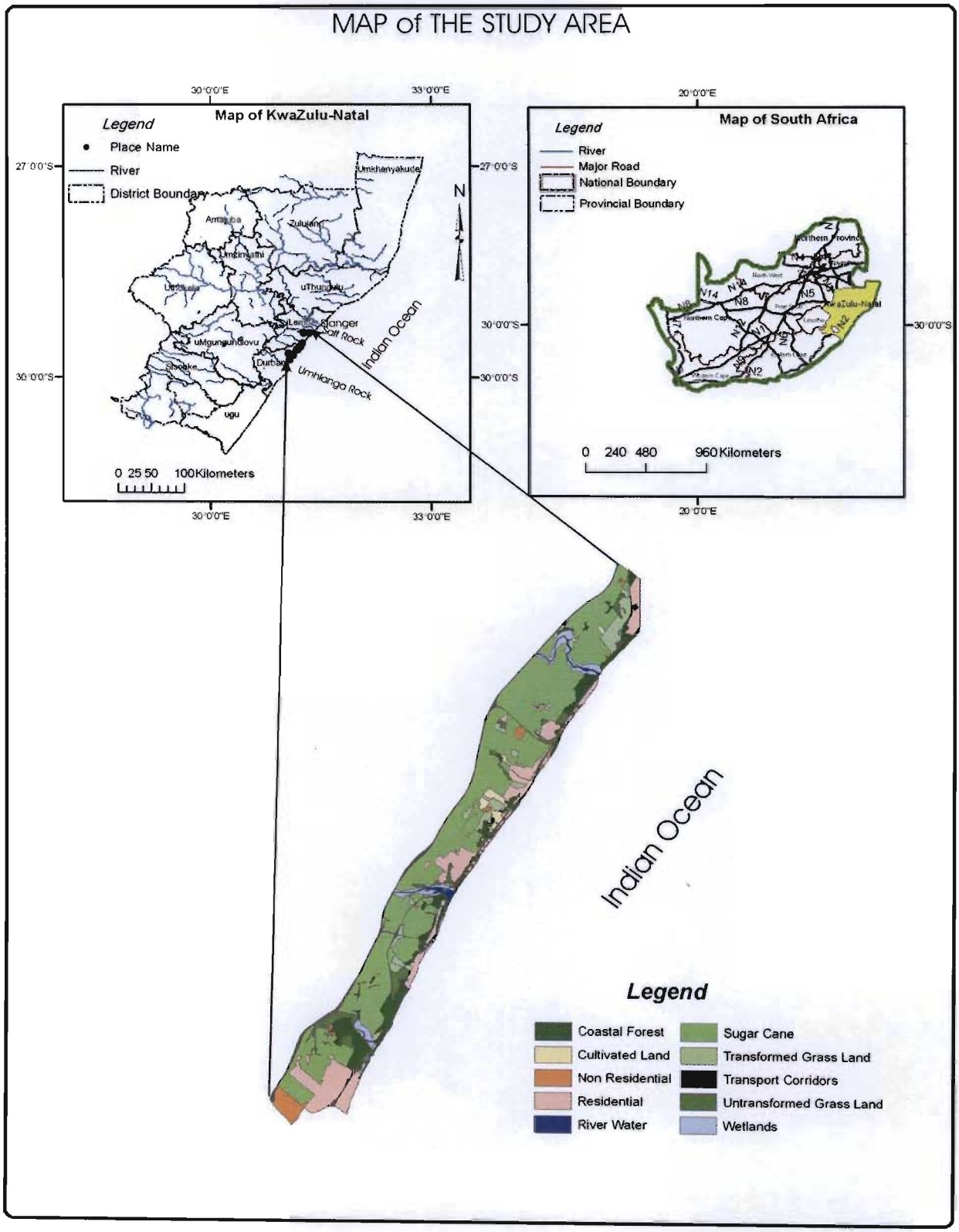


Figure 3.1 Map of study area

3.3.1 Climatic Conditions

The KwaZulu - Natal north coast is characterised by an increase in temperature and humidity, as one travels further north. Summers are hot, and winters are mild, with a mean annual temperature range of between 19.4°C and 21.1°C (Camp, 1998). Rain falls mainly during summer months, with a mean annual range of between 825mm and 1 272mm (Camp, 1998). Furthermore the Agulhas current carrying warm water southward from the tropics moderates air and sea temperatures and provides conditions conducive for coastal recreation and tourism. The relatively good rainfall combined with average to good soils, supports commercial agriculture (sugar cane) in the area.

The coastal zone is characterised by summer storms, high winds and windblown sand, salt and spray. These conditions create difficult conditions for the growth of vegetation and also lead to deterioration of built structures (Markewikz, *et al.*, 2000). Wind speeds are the highest along the coastal areas of KwaZulu - Natal, with the average yearly wind run being 161.0 km/day at Empangeni (Camp, 1998).

3.3.2 Geology and Soils

The area under investigation lies on the seaward slope of the escarpment, which is tilted down towards the sea. According to Pistorius (1962), this movement which has tilted the province is still slowly continuing, enhancing erosion of the land surface and depositing the soil off shore. Camp (1998), states that the geological formation of the province runs roughly north to south, across an eastern sloping terrain, while river systems run wet to east, cutting through the geology, hence resulting in deep incised valleys. The general geology of KwaZulu – Natal is described in Figure 3.2.

The coast rests on a granite basement of the Archaean Complex, followed by the Table Mountain Sandstone (TMS) series of the Cape System; Dwyka Tillite, Middle and Lower Ecca Shale series of the Karoo System; Schist and recent sands (van der Eyk *et al*, 1969). Numerous dolerite outcrops of the Midlde Ecca series occur along the coastline, the natural pool at Umdloti being a notable example (Pistorius, 1962). Soils are derived from rocks (parent material), which have weathered due to environmental factors such as climate (particularly rainfall and temperature), topography, drainage, vegetation and the action of living organisms (van der Eyk, *et al.*, 1969). Camp, (1997) states that since environmental factors vary from place to place, there exists variations in soil patterns. This is indeed present.

Table 3.1 Soil series (Thorrington – Smith, *et al.*, 1978)

Soil Series	**Parent Material**	**Colour & Texture**	**Characteristics**
Glenrosa	Granite	Dark brown, dark greyish brown	Loamy sand & coarse sand loam
Cartref	TMS	Dark brown to dark greyish brown	Loamy sand and clay
Williamson	Dwyka Tillite	Very dark greyish brown	Weak blocky sand loam to sandy clay loam
Milkwood	Lower Ecca Shale	Bluish grey and yellowish grey	Shallow soils, rubbly loam, clay loam & weathering clay
Shortlands	Dolerite	Dark reddish brown	Blocky clay
Glendale	Schist	Greenish black	Crystallising rock of sedimentary origin but considerably metamorphosed
Clansthal	Recent Sands	Red	unconsolidated Aeolian sand overlying deep red sand that is consolidated
Fernwood	Recent Sands	Grey	Shallow soils

The land use potential of these soils varies. The Glenrosa, Milkwood, Cartref and Shortland soils are very conducive to the cultivation of sugar cane and to the application of fertilisers. Shortlands contain minerals that are undergoing their first weathering process hence they are considered extremely fertile and are the most productive primary soils in the sugar industry (Thorrington – Smith, *et al.*, 1978). The Williamson series has low agricultural potential, poor seed germination capabilities and low crop response to fertilizers (Thorrington – Smith, *et al.*, 1978). While Glendale has good water – holding capabilities, it is difficult to work under excessively wet or dry conditions. Fernwoods are the least productive soils in the sugar industry and sometimes only the surface horizon has any fertility.

Clansthal is redistributed and weathered aeolianite and coast aeolian sand. They cover most of the hills and valleys of the coastline, except in the vicinity of rivers (Thorrington-Smith, *et al.*, 1978). These soils possess excellent water retention capabilities, and allow for the penetration of roots to considerable depths. As sand accumulates and vegetation increases, dunes are formed. Clansthal soils are especially prone to erosion if vegetation cover is removed. In many cases along this coastline, (Shaka's Rock, Umdloti, Umhlanga Rocks, La Mercy and Mdloti mouth), the modern coastal dune is backed against this Red Sand, with dunes reaching heights of 40m in places at Umdloti (Cooper, 1991; Cooper, 1995). This dune is a prominent feature of the study area.

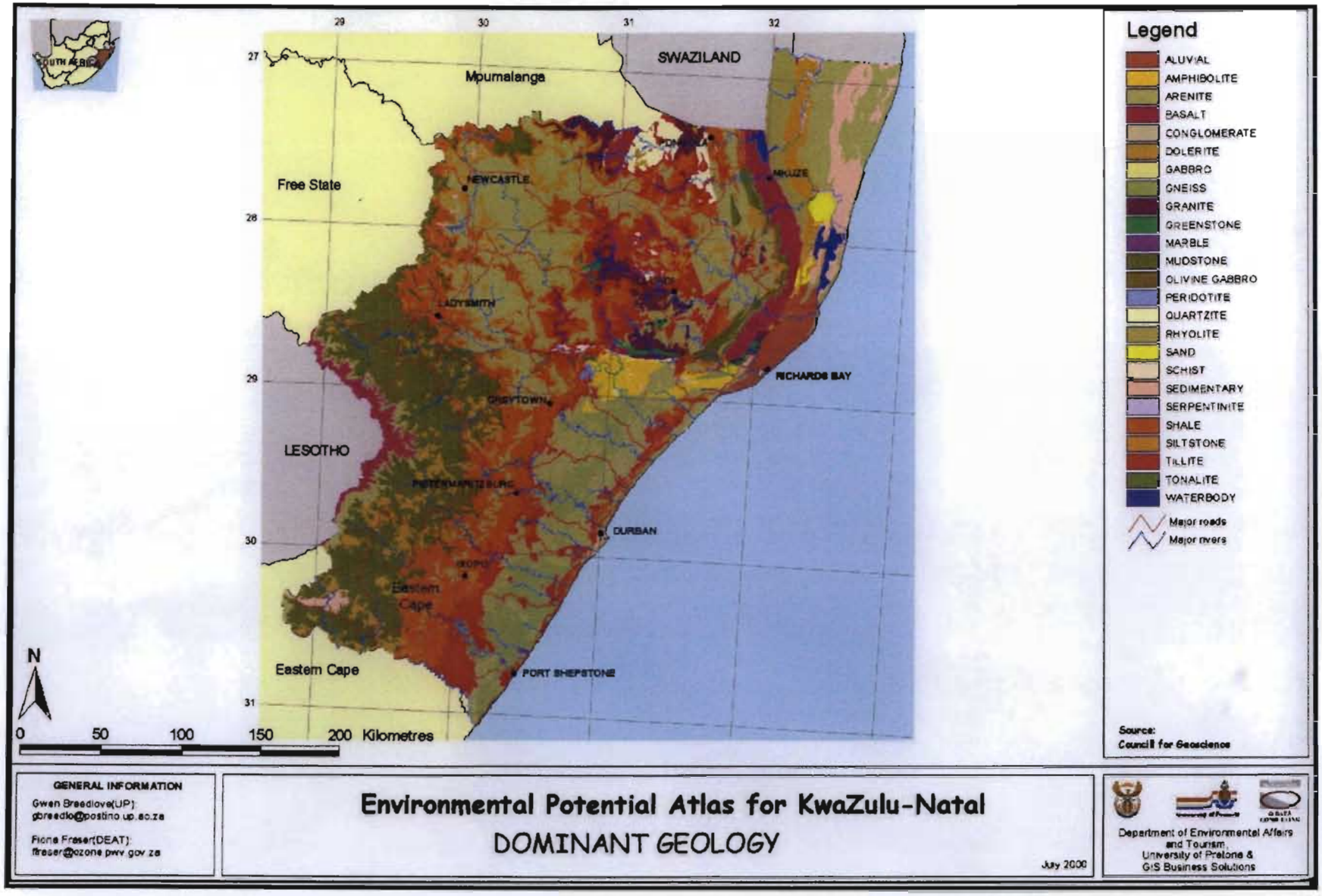


Figure3.2 General Geology of KwaZulu – Natal (DEAT, 2000b)

3.3.3 Potential Impacts of Sea Level Rise

Current scientific opinion is heavily weighted towards the detection of a global SLR, linked to human-induced global warming (Cooper, 1991). Hughes, *et al.,* (1991, cited in Cooper, 1995), predicts that the sea level in South Africa is likely to rise by 20cm within the next 40 years, followed by a further 70 – 100cm by the end of the next century.

Cooper (1991) has classified the geomorphology of the coastline as either rocky or sandy coasts, which are 'high risk' areas in the littoral active zone, and thus have important implications for future SLR:

Table 3.2 Rocky and sandy coastlines

ROCKY	SANDY
Salt Rock to Zimbali	Zimbali to Tongati river
South of Tongati river to Mdloti river	South of Umdloti tidal pool to Umhlanga Rocks
Mdloti river to Umdloti tidal pool	

Cooper (1993; cited in Jones, 1994), in his evaluation of variations in South Africa's sea levels, presents scenarios of future sea level changes, and discusses its likely impacts on sensitive areas along the coast where the impacts are likely to be felt. These findings are summarised as follows:

- Likely shore retreat at Zimbali and Umhlanga Rocks

- Undermining of the coastline and beach reduction at Umdloti and Umhlanga Rocks
- Possible dune blowouts on the M4 where it runs close to the coastline at Tongaat Beach

From these findings, it is clear that sandy and exposed sections of the coastline are more prone to threats from a possible SLR than rocky sections. Cooper (1993, cited in Jones, 1994), advocates the retention of coastal dune vegetation as this will allow for minimal impact and will enable the shoreline to retain its natural equilibrium.

3.3.4. Estuaries

The estuarine environment is an important component of the coastal ecosystem. On the north coast, agriculture has been the main factor contributing to estuarine degradation through siltation and pollution. However, with the conversion of cane land to urban land uses, the latter are likely to play a greater role in impacting on estuaries in the future. Natural processes also impact on estuaries in the area such as the process of silt deposition, caused by the tilting of the escarpment, which is continuing, hence the presence of off-shore sand bars which close off estuary mouths (Pistorius, 1962). This is a common feature of the entire KwaZulu - Natal coastline. The study area includes the following estuaries: Tongati, Mdloti and Mhlanga.

3.3.4.1 The Tongati Estuary

The estuary is a shallow system which generally has an open mouth, due to the protection it receives from the rock outcrop immediately south of the mouth (Begg,

1984). Demetriades (undated) suggests that this open mouth has more to do with human interference such as stream braiding than natural conditions. The right river bank comprises a steep rock-face of TMS, whereas the left is a soil covered slope (Thorrington- Smith, *et al.*, 1978).

The water quality of the estuary has been documented as poor since the 1960s, resulting from the heavy industrial and agricultural pollution (Demetriades, undated). According to the CSIR (1989; cited in Demetriades, undated), the concentration of nitrates from agricultural and industrial sources has increased from 0.07mg/l to 1.9mg/l in the upper reaches. Furthermore, high levels of faecal coliform bacteria (*Estirichia coli*), have been highlighted over the last 30 years, and are well out of Department of Water Affairs and Forestry's (DWAF) target water quality range for recreational use (Demetriades, undated). Begg (1984) states that due to high polluting factors, the estuary is characterised as poorly oxygenated, with a tendency for the bottom water to become completely anoxic, thus threatening biological utilisation.

3.3.4.1.1 Flora

According to Begg (1978), the botanical value of the Tongati estuary system has been severely affected by sugar cane encroachment on its northern bank and upper reaches. The remaining areas of value include a patch of coastal forest on the southern bank of the mouth (Demetriades, undated). According to Nichols (2004), the wetland is in relatively good condition and no sugar cane has encroached on the river, which has helped preserve what little natural vegetation there is. The main problem, according to Nichols (2004), is the encroachment of invasive weeds that result in the smothering of riverine vegetation on the eastern section of the estuary, and include: Brazilian Pepper

(*Sehinus terebinthifolius*), Balloon Vine (*Cardiospermum grandiflorum*), Mauritius Thorn (*Caesalpinia decapetala*), Gauva (*Psidium guajava*), and Lantana (*Lantana Camara*).

Begg (1984) recorded an explosion of water hyacinth during his study of the estuary in the 1980s. Inland of the Tongati crossings by the N2 and M4, the estuary has been invaded by woody vegetation, mainly due to river silting – Swamp Hibiscus (*Hibiscus tiliaceus*), the Puffball Tree (*Barringtonia recemosa*) – these two being native plants; and Brazilian Pepper (*Schinus terebinthifolius*), the latter having colonised an area which would otherwise have been natural mangrove populations before silting occurred (Nichols, 2004).

3.3.4.1.2 Fauna

Fish catches and bird sightings are often good indicators of the health of the estuary. In the category of invertebrates, Blaber, *et al.,* (1984, cited in Demetriades, undated), noted that the benthos was dominated by the Polychaete worm, *Prionospio* species and Chironomid fly larvae; all indicative of an enriched system, while zooplankton was considered impoverished. During a survey of fish species in the early 1980s, Begg (1984) recorded 29 different species however only 51% survived after the system was flushed out by floods in September 1980. Mullet of five different varieties comprised 67% of the catch prior to the flood, as these species are more tolerant of polluted conditions (Begg, 1984). Two fish species – *Aplocheilichthys myaposae* (freshwater species) and *Caranxignobilis* (marine species), taken from the Tongati were not recorded in any of the other 62 systems surveyed by Begg (1984).

Blaber, *et al.*, (1984; cited in Begg, 1984), recorded the presence of 27 bird species in 1981 and concluded that although the herbivorous ducks were common (probably attracted by the shelter provided by the water hyacinth), the number of fish-eating and invertebrate feeding species was low.

3.3.4.2 The Mdloti Estuary

The upper reaches of the Mdloti flows over granite and TMS, followed by Dwyka Tillite and Ecca Shales in the lower catchment, with recent sands at the immediate coast (Thorrington-Smith, *et al.*, 1978).

Whilst the Mdloti is considered a closed system (Harrison, *et al.*, 2000), the mouth was found to be frequently open (Begg, 1984). This is attributed to the artificial breaching of the sand bar, in the interests of preventing the flooding of sugar cane adjacent to the river banks. According to Demetriades (undated; cited in Ryan, 2004a), there are extremely high bacteria counts downstream of the Verulam treatment works, suggesting that it had been contaminating the river. Nitrate levels in the estuary were found to be high, the source being runoff from fertilised cane (Begg, 1984).

3.3.4.2.1 Flora

The Mdloti is considered to be a botanically well endowed system owing to the different types of lagoonal plant communities found, eg. fresh water mangroves on its southern shore (Begg. 1984). The sandbar is notably covered by binding vegetation – *Scaevola thunbergii*, *Ipomoea brasiliensis* and *Sporobolus virginicus*.

3.3.4.2.2 Fauna

During the 1980s, 42 specimens of different species were captured – 28 types of fish, 8 types of prawns and 6 species of crabs (Begg, 1984). According to Skelton (2000; cited in Goodman, 2000), one record of a Red Data Book species (vulnerable in South Africa) of fish – *Redigobius bikolanus* or bigmouth goby, was found in this estuary. Some of the bird species noted by Begg (1984), include: African jacana, Purple gallinule and Blackcrowned night herons. According to Holland (2004, cited in Ryan, 2004a), the number of birds frequenting the lagoon have dropped drastically in the last year, due to the invasion of the lagoon by kite surfers and jet skiers. Demetriades (2004; cited in Ryan, 2004a) believes that estuaries should be zoned to ensure that natural resources are not undermined by tourist activities.

3.3.4.3 The Mhlanga Estuary

The Mhlanga Estuary is considered by Harrison, *et al.,* (2000) to be a closed system. The Mhlanga Lagoon is fronted by a river mouth barrier 1 500m long – the southern 900m of this barrier are covered by forested dunes, while the northern, active 600m stretch is only lightly vegetated (Cooper, 1995).

Extremely low salinity is a distinguishing characteristic of this system (Begg, 1984). The factors contributing to this exceptional case are due to the following factors: the sand bar isolates the lagoon from the sea for periods of nine months or longer, but it is also sufficiently porous to permit seepage through it; the level of the lagoon is above that of the sea, hence the flow is always outward so the system constitutes little else but river water (Begg, 1984). Oxygen levels are considered to be low, and this is

attributed to the discharge of effluent from the Umhlanga Rocks sewage treatment works situated 2 km above the lagoon (Begg, 1984).

3.3.4.3.1 Flora

Begg (1984) identified two notable plant species in the Lagoon – duckweed on the surface and beds of fennel-leaved pondweed in the lower reaches.

3.3.4.3.2 Fauna

Information on the zoobenthos, zooplankton, epiphytic flora and fauna and fish is provided by Whitfield (1980; cited in Begg, 1984) – zooplankton was dominated by *Calanoid copepods* (mainly *Pseudodiaptomus lessei*), the zoobenthos by the *amphipod* (*Corophium triaenonyx*) and two *polychaetes* (*Ceratonereis erythraeens*is and *Dendronereis arborifera*), the epifauna was dominated by *Corophium trienonyx* (*Amphipoda*) and *Ficopomatus enigmatica* (*Polychaeta*). Thirty two fish species occurred and was dominated by *Cichlids* and mullet, which accounted for 92% of the biomass, while in terms of numbers, *Oreochromis mossambicus* outnumbered other species (Whitfield, 1980; cited in Begg, 1984).

Begg (1984), cites the presence of the following bird species: Dabchick, Whitebreasted cormorant (*Phalacrocorox carbo*), Reed cormorant, Darter (*Anhinga rufa*), Grey heron (*Ardea cinerea*), Purple heron, Blackcrowned night heron, Egyptian goose, African Black duck, Yellowbilled duck, African fish eagle, Purple gallinule, Moorhen, Kelp gull (*Larus dominicanus*), Greyheaded gull (*L. cirrocephalus*), Swift tern (*Sterna bergii*), White browed coucal, Pied kingfisher and Giant kingfisher.

3.3.5 Vegetation

Botanists concur that centuries ago, most of KwaZulu - Natal was covered by some form of forest (Acocks, 1988; Thorrington-Smith, *et al.*, 1978); however, very few patches remain today. Pistorius (1962) maintains that the distribution of forest was probably always discontinuous due to grass fires. Moll (1976, cited in Armstrong, undated), states that, fire, whether human-induced or caused by lightening, has been a significant disturbance in the coastal region of KwaZulu - Natal for hundreds or thousands of years.

Two sources of vegetation community data exist for KwaZulu – Natal, namely: 'Veld Types' (Acocks, 1988) and Bioresource Groups (BRG) (Camp, 1997; 1998). Veld Types refer to a unit of vegetation whose range of variation is small enough to permit the whole of it to have the same farming potential (Acocks, 1988). A BRG consists of a single vegetation type, comprising a number of Bioresource Units (BRUs) that are defined as demarcated areas of land in which climate, topography, soils and vegetation are sufficiently similar to permit uniform recommendations for land use (Camp, 1997).

Acocks (1988), has identified the veld type in the area as: Coastal Forest and Thornveld, while Camp (1997) has defined it as BRG1 – Moist Coast Forest, Thorn and Palm Veld; Subgroup 1.3 – the North Coast, which stretches from the Mhlatuze River in the north to Durban in the south (Figure3.3). BRGs are defined mainly by climate and vegetation type, although soils can vary considerably as well. In BRG1, major soil changes have resulted in the identification of five subgroups.

Most of the natural forests in the study area have been removed for the planting of sugar cane, which today, is the predominant vegetation type on the north coast. In KwaZulu - Natal, coastal forest and thornveld have been 88% transformed (Adie & Goodman, cited in Goodman, 2000).

Relics of natural coastal forest currently remain in patches where the land is not required for other uses, or where its exploitation is difficult (Pistorius, 1962). The only indigenous forests in the area are Hawaan Forest and Zimbali Coastal Forest. These serve important functions: conserving their constituent species, providing seed sources for surrounding forest and the maintenance of certain plant and animal species in KwaZulu – Natal as a whole (Jones, 1994).

Natural Coastal forest is mostly short (5-10m), dense and tangled especially towards the coast, but against the seaward-facing hills further inland it becomes taller and less tangled, reaching heights of 20m or more (Acocks, 1988). Indicator tree species that occur include: *Millettia grandis, Protorhus longifolia, Strelitzia nicolai, Croton sylvaticus, Macaranga capensis, Schefflera umbellifera and Syzygium cordatum* (Acocks, 1988; Camp, 1998).

Where the natural vegetation has not been cleared for sugar cane, the area between the forest patches is open thornveld, bush clumps, tall grasses and patches of forest in different stages of succession between grassveld and forest (Acocks, 1988). Common tree species are: *Acacia karoo*, *A. nilotica* and *A. robusta* (Camp, 1998).

Fringing the sea for the length of the north coast, is a characteristic type of vegetation closely related to the coastal forest, but adapted to sea salt and spray – known as the Coastal Dune Forest (Pistorius, 1962). More of this type of forest survives than any other along the coast (Acocks, 1988). With a combination of beach flora and the mud flats of estuaries, it is also the most fascinating. Plant species in the coastal dunes, according to Camp (1998) are:

- Succulents which aid in initial sand dune stabilisation – *Scaevola thunbergii, Carpobrotus acinaciformis* and *Arctotheca nivea*
- Low growing communities that stabilise dunes – *Ipomoea pes-caprae, Gazania rigens* and *Cyperus natalensis*
- Stabilised dune vegetation – *Passerine rigida, Eugenia capensis, Mimusops caffra,* and *Brachylaena discolor. Imperata cylindrical* and *Sporobolus. Virginicus* are important grass species in the area.
- Dune forest (low dense and evergreen) – *Mimusops caffra, Eugenia capensis, Deinbollia oblongifolia, Brachylaena discolour* and *Allophylus natalensis.*

The coastal dune forest community holds its environment in a delicate state of equilibrium, which is easily disturbed by careless destruction of the vegetation cover (Pistorius, 1962). According to McDevette, *et al.,* (1989), closed woody communities of mangroves over 5m in height occur along the entire KwaZulu - Natal coastline in estuarine environments. The most common indicator species are: *Bruguiera gymnorrhiza* and *Avicennia marina.*

Mammal species that occur in this veld type are: the vervet monkey (*Chlorocebus aethiops)* and bushbuck (*Tragelaphus scriptus*) which are considered to favour the

forest edge; the blue duiker *Philantomba (Cephalophus) monticola*, red duiker *Cephalophus natalensis*, bushpig *Potamochoerus porcus* and banded mongoose *Mungos mungo* (Cooper, 1985; cited in Armstrong, undated).

The African honeybee *Apis mellifera scutellata* is undoubtedly one of the most important insect pollinators of plants in the Hawaan Forest. Several Red Data species have been recorded in the Hawaan Forest and surroundings: red duiker, blue duiker, cuckoo hawk, golden mole, kuhl's bat, spotted thrush, wattle – eyed flycatcher, African rock python, forest cobra and Natal hickory.

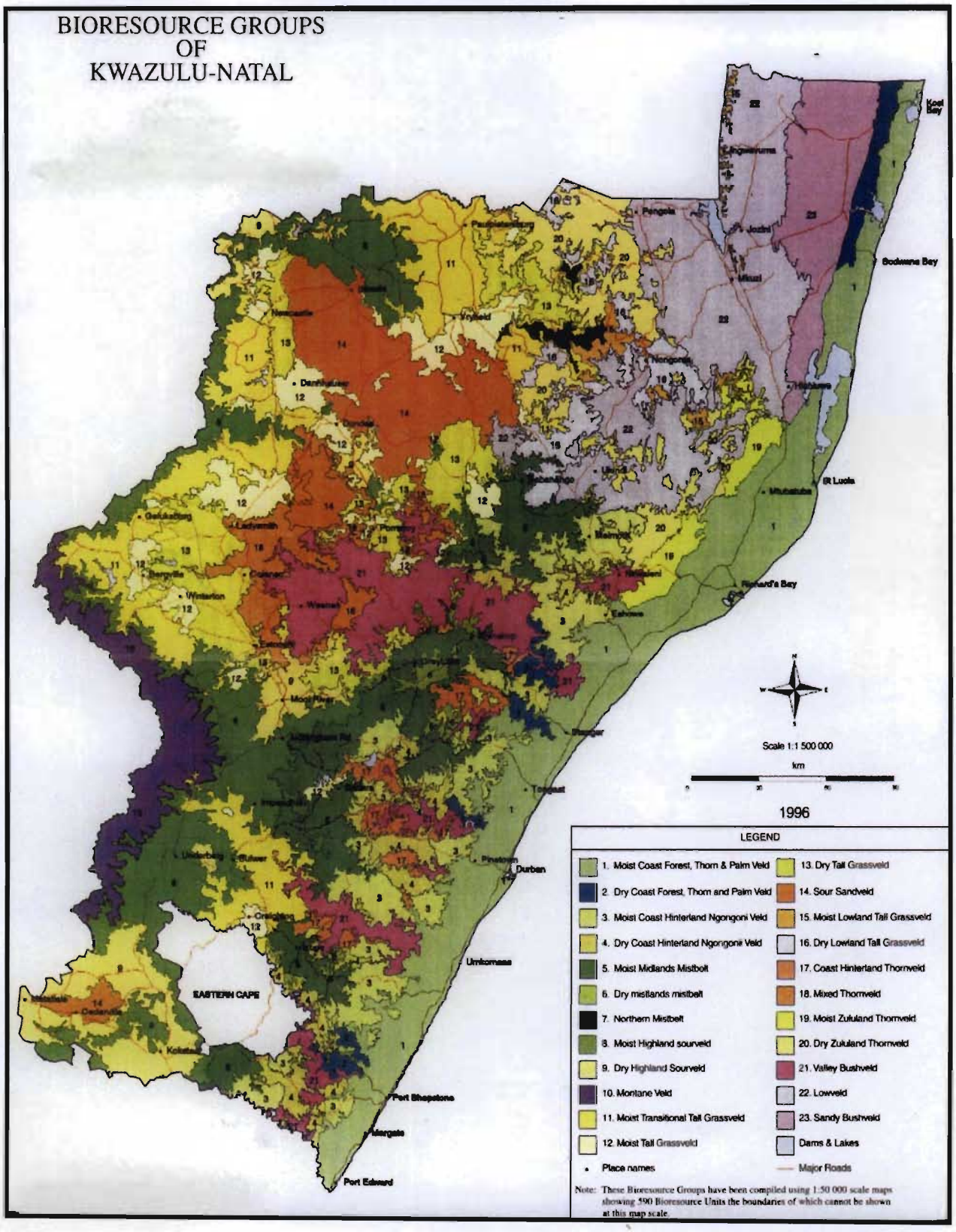


Figure 3.3 The Bioresource Groups of KwaZulu – Natal (Camp, 1997)

3.3.6 Natural Open Space Inventory

Natural open spaces are found mainly within undisturbed or disturbed terrestrial, freshwater and estuarine/marine ecosystems and include habitats that are a distinct land cover (Roberts, *et al.*, 1999).

Table: 3.3 Natural open space land cover distribution per catchment (Roberts, *et al.*, 1999)

Drainage Catchment	**TERRESTRIAL**				**RIVERINE**				**COASTAL**			**Total (ha)**
	Grass-lands	Forests	Re-creation	Geo-logical	Rivers	Flood-plain	Wetlands	Dam	Estuary	Sandy Beach	Rocky Shore	
Tongati	582	167	171	0	22	468	22	26	4	45	10	**1517**
Umdloti	664	368	117	12	29	708	78	0	54	29	10	**2069**
Mhlanga	781	835	381	0	38	750	73	6	18	68	5	**2955**
TOTAL	**2027**	**1370**	**669**	**12**	**89**	**1926**	**173**	**32**	**76**	**142**	**25**	**6541**

[Catchments with zero value, for rivers, have their river area reflected under the flood plain category]

3.4 Land Use

3.4.1 Early Settlement

Due to its favourable climate, good water resources and productive soils, KwaZulu - Natal's coastal margins proved especially suitable for sugar cultivation, and this led to the growth of an export-oriented agricultural system developing along much of the coast in the late nineteenth century (McCarthy, 1987).

European settlement began in the area due to the influence of the sugar industry, and the establishment of road and rail links serving the industry, opened up the north coast to development (Jones, 1994). The influence of the sugar industry on the emergence and pattern of land use on the north coast is undeniable. Early settlement along the R102 (main road), began as a result of the presence of sugar mills at Mt Edgecombe, Maidstone, Shakaskraal and further north; where almost entire populations of these settlements were employed, hence stimulating the growth of inland centres (Pistorius, 1962).

Practically all the land in the area was held under private ownership and as productive sugar lands. Pistorius (1962) states that, the sugar industry, which dominated the economy of the north coast, in the 1960s, was a highly organised, stable and prosperous activity. It was no wonder then, that where land which was capable of producing cane, was considered a valuable asset, and therefore there was little temptation to look for quick and easy profits in the land speculation market. Hence, this was probably the reason for the apparent lack of development in the area.

Furthermore, farmers denied or limited access to majority of the coastal strip, due to the vulnerability of cane to fire, and it was common to find notices warning people against trespassing on private roads (Pistorius, 1962).

Increasingly, however, in the 1960s, the attractiveness of the coast began to draw holiday-makers, primarily the white middle classes from the interior of the country (McCarthy, 1987). Access to the coastline was enhanced by the opening up of the M4 which runs very close to the beach, hence, the creation of small resort towns at

Umhlanga Rocks, Umdloti and Salt Rock. These areas in particular, have natural rock formations, such as the natural pool at Umdloti, which proved popular with tourists. The M4 also commands exceptional views of forest and the sea. These factors are probably the reason that the first resorts were developed in these areas. Umhlanga was notably the fastest growing resort, as well as a dormitory town, owing to its proximity to Durban which was fast growing as an economic centre. It should be noted that the development of each of the roads opened up each successive phase of development on the north coast.

3.4.2 Change in Land Use

The domination by the sugar industry over land use witnessed a change in the mid-twentieth century as both internal and external pressures now necessitated change – the conversion of primarily agricultural land to other uses. The internal pressures came from conversions in production within the sugar industry itself, while the main external pressures resulted from the expansion of Durban and the growth in tourism.

The sugar industry moved into a stage of technological advancement. This shift heralded in a stage of labour surplus. Matters were further complicated by the fast-growing, mainly Black and Indian populations. Hence, surplus labour had to be contained through necessary local industrialisation and the concomitant urbanisation of the labour force – what McCarthy (1987) terms, *employment oriented growth.* Durban was also expanding rapidly and hence more land was required. This brought agricultural land into demand.

The development of coastal resort towns was yet another external pressure which would threaten the dominance of the single - industry society by heralding social and economic diversity, and with it, the need for adaptation (Pistorius, 1962). Opening up the coastline to recreation would also result in infrastructural changes, which accompany the development process, and is a predictive inverse measure to the level of undeveloped land (McCarthy, 1987). Another concern that Pistorius (1962) raised, was that the development of resorts might lead to the temptation to speculate land, thus inflating land prices beyond its worth for productive agriculture.

3.4.3 Current Situation

The preoccupation with retaining land for agriculture is no longer tenable. This is apparent even within the current major land owner and sugar company (Tongaat Hulett), which now has a property division – Moreland. In the last two years this coastline has opened up to intensive property development in the tourist and residential sectors.

This shift to property is fuelled by the fact that economic sectors such as manufacturing and agriculture have been performing poorly (due to increased international competition, labour costs, etc), and are under pressure in South Africa (Markewikz *et al.,* 2000). This pressure is anticipated to result in declining sugar prices in future. On the other hand, tourism has become the leading sector worldwide. According to Wilson (cited in The Daily News Reporter, 2004), a comparison of the South African market to a world market of residential real estate reveals that the South African market is still undervalued. Hence, higher returns can be gained from

land uses such as residential and tourism development, and this has prompted land owners to look to these alternatives.

3.5 Spatial Development Initiative

Spatial Development Initiatives (SDIs) describe a programme of strategic initiatives which are designed to unlock the inherent and economic development potential of specific spatial locations (Stavrou, 2002). Enshrined in the strategic initiatives of the SDI is the focus towards the approach in which international competativeness, regional co-operation and diversified ownership are promoted. The N2, which runs through the study area, has been designated as a SDI by the National Departments of Transport and Trade. The strategic advantages of the N2 corridor are: its location between the ports of Durban and Richards Bay; its competitive advantages to industrial, commercial, tourism and agricultural sectors and an international airport (King Shaka) and adjacent Dube Trade Port (these two projects are soon to be built). The corridor is also served by a sophisticated road and rail network. Combined, these advantages are seen to build the base for a successful economy (DEAT, 2004).

3.6 KwaZulu – Natal Tourism Product Development Strategy

The study area falls under the KwaZulu – Natal Tourism strategy for the province (Appendix I). The strategy is based on the development of a 'tourism product'. For the study area, this is based on the Zulu branding which aims to unlock the Zulu culture. The strategy aims to concentrate on the development of events and attractions that impact positively on tourist arrival, community based tourism, areas of cultural and environmental significance, and human resource development through

community participation (education and training). The following priority projects have been proposed for the area:

- King Shaka tourism route
- Coastal resort complexes with waterfront and marina facilities
- A five star rating world class coastal resort at the Tongati river

3.7. Human Assets

The study area has a dynamic mix of people who provide a diverse cultural heritage. Traditional and contemporary Zulu, European and Indian cultural styles intermingle and provide a rich tapestry of architecture, language, cuisine, festivals, religions and history (DAEA, 2004). In addition, the area has a good social infrastructure with regard to active community based organisations (CBOs), non -governmental organisations (NGOs), and conservancies. There are, however, marked differences between the populations east and west of the N2. The populations on the east side are affluent, educated and mostly white; while those West of the N2 are majority poor and black. Municipalities are faced with the challenges over the apparent contradiction – between providing housing and employment opportunities for the poor, whilst realising the potential for tourism and quality environments for the wealthier people (Jones, 1994).

3.8 Proposed Development

3.7.1 The Sibaya Precinct

The Sibaya Precinct development is a proposed project by Moreland Developments, and includes land surrounding the Sibaya Casino. The proposed project is located

between the N2 and the Hawaan Forest in the south and the Main Road into Umdloti in the north.

The area, some 855ha, includes indigenous coastal forest (Hawaan Forest, Forest 31 and Mhlanga Forest), grassland, the Mhlanga River and floodplain and agricultural land under cane. Moreland is currently undertaking a scoping exercise for the development by taking a holistic and integrated view of the entire node.

The concept of a Botanical Garden and Conservation Trust proposed by the Hawaan Botanic Project Committee, (a joint venture between the Umhlanga branch of the Wildlife and Environmental Society of South Africa (WESSA) and the Natal coast branch of the Botanic Society of South Africa), will be considered for inclusion into the Precinct. According to Mather (2005), "this is an attempt to keep as much of the conservation area as possible, and work with rather than against it".

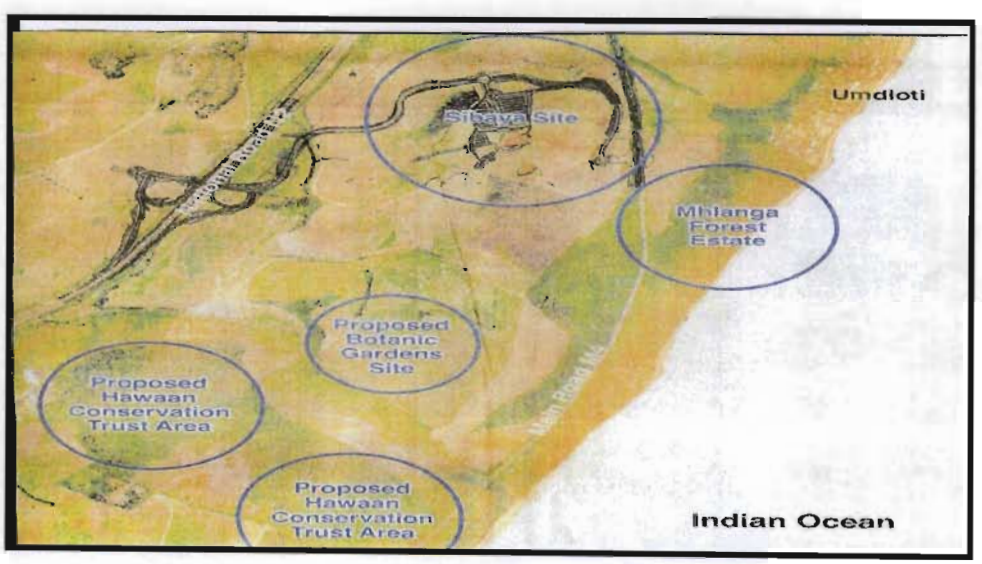


Plate 1: Proposed Botanical Garden and Conservation Trust (Ryan, 2004b)

The proposed Sibaya Precinct development will involve converting agricultural land to urban uses. There are existing zoning rights for residential and resort development in the area. The potential type of development and division of land use types (Figure 3.4) include: resort, residential, commercial, eco – tourism activity and conservation areas.

The following negative impacts are expected: damage to ecosystems, habitat loss, disturbance to fauna, dune destabilisation, soil erosion, losses of indigenous vegetation and the impact of storm water on estuaries. While Moreland acknowledges these negative impacts, they stress on careful management.

The following positive spin - offs are expected: the formalisation of the Conservation Trust and the potential development of a Botanic Garden to ensure long – term maintenance of the forests, the creation of employment opportunities, and the provision of commercial an residential opportunities.

3.8.2 The Umdloti – Tongaat Spatial Framework Plan

In 2000, the North Operational Entity (the then local authority for the area concerned) undertook a planning process entitled: Durban Metropolitan Area (DMA) Coastal Tourism Development Plan; Planning Design and Management Guidelines: Umdloti – Tongaat Area Spatial Framework Plan (SFP) (Markewikz, *et al.*, 2000). In light of the plans now being applied by the eThekwini Municipality for the DMA, it has been suggested that the SFP be reviewed and considered as part of the process towards a Local Area Plan (LAP) and subsequent land use management plan (LUMP).

The draft LAP (2005) attempts to test the feasibility of implementing the SFP against existing development controls (Town Planning schemes and zoning) and development pressures, and through legal opinion which may arise on matters such as the transfer of development rights or matters needing compensation.

The SFP emerged for the following reasons: this coastline is a major Metropolitan asset (part of D' MOSS), and has received little planning attention. The current situation, according to Markewikz, *et al.*, (2000) is as follows:

- there is a lack of safe swimming beaches (except Umdloti and Westbrook) and infrastructure (ablution facilities and parking);
- the area is badly degraded in terms of natural assets and the poor visual quality of the buildings which limit tourist potential;
- apart from agriculture (market gardening) and the little activity at the Umdloti node, there is a lack of commercial activity in the area;
- there exists *ad hoc* subdivisional settlement patterns; and
- there is a need to create employment and boost the economy of the area

The SFP uses catchments as a tool for understanding the capacity and functioning of the natural system and for determining appropriate management intervention (Figure 3.5). Other elements of the SFP include: open space systems, land use activity systems, movement systems and transport and infrastructural systems. These interventions can be guided and controlled by the Town Planning Scheme, architectural guidelines, environmental guidelines (especially national legislation) and bylaws.

The review of the SFP in conjunction with the Scheme and legal opinion, (outlined in the draft LAP), revealed the following:

- there exists no mechanism in the scheme to downgrade development rights and if there was, there would certainly be a requirement for compensation and it likely to be highly contested.
- The scheme is overly generous in awarding development rights that may result in inappropriate coastal development from an environmental perspective. Furthermore, the scheme lacks certain elements for the regulation of development on coastal areas, and the following should be included:
- a scheme clause to prompt the preparation of EIA for all new development within 46m of the HWM
- a scheme clause requiring all coastal fronting properties to prepare EMPs to mitigate against environmental harm
- a scheme clause requiring all building plan submissions to include a visual impact assessment
- notification of all properties encroaching onto state land

3.8.3 Zimbali Lakes

The KwaZulu – Natal Tourism Product Development Strategy has highlighted the KwaDukuza municipality as a key tourism destination and node along the coastline along the 'King Shaka Region' and Gateway to Zulu Cultural Heritage Route. It highlights the development of a coastal resort – Zimbali Lakes by Moreland- on the northern bank of the Tongati River. The proposed project has both provincial and

municipal support and has been designated a priority issue for job creation in the area. The project is expected to create some 5 000 jobs.

The proposed project comprises some 50 – 70 km of beach and coastline. The proposed project description includes: an 18-hole golf course, a golf course residential estate (approximately 600 – 700 units), offices and services, one five star hotel (with 250 beds and approximately 400- 500 units, approximately 33ha of lake for recreation. The proposed development is recreation/tourist based and has natural resource conservation as a key point.

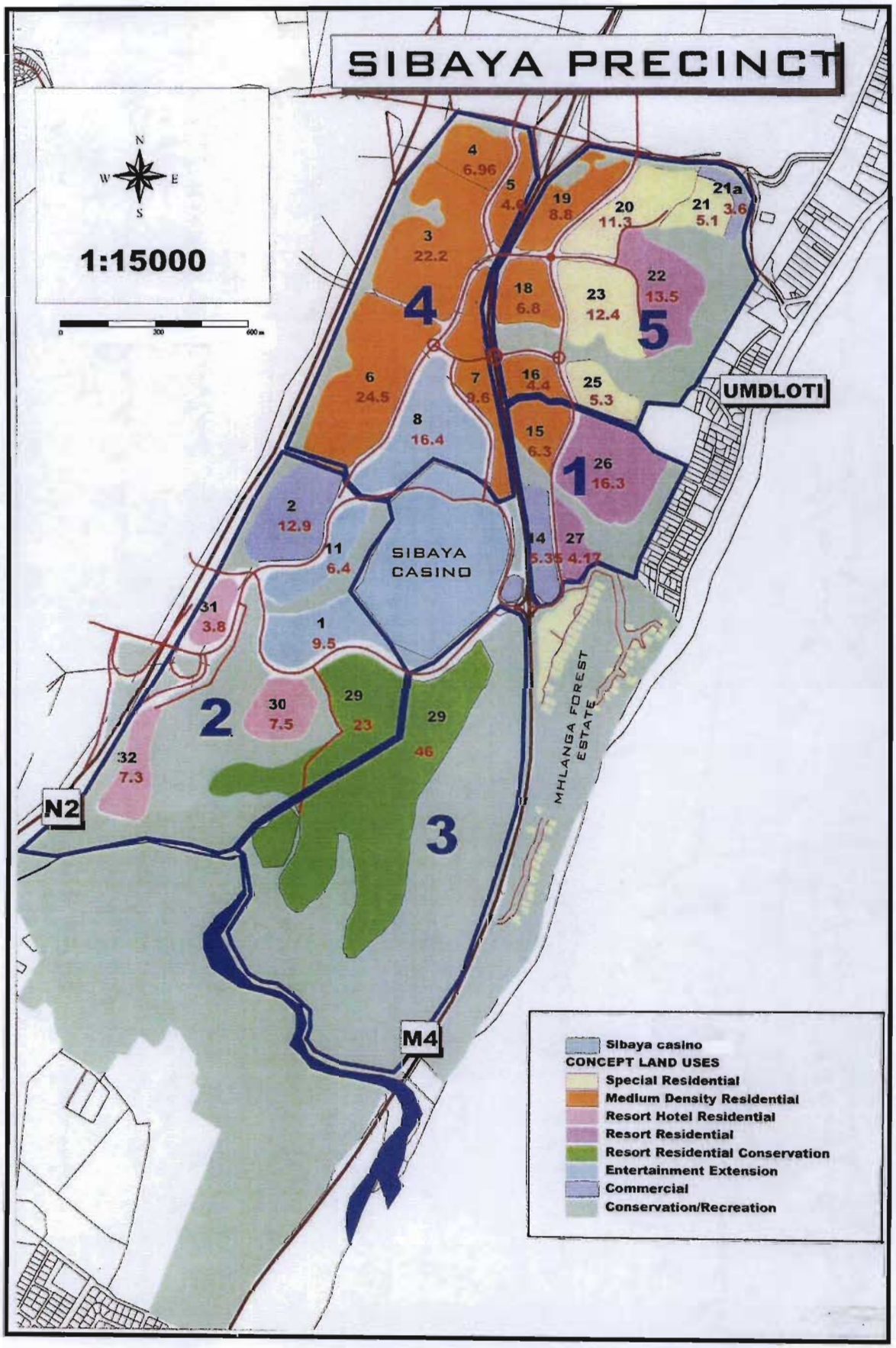
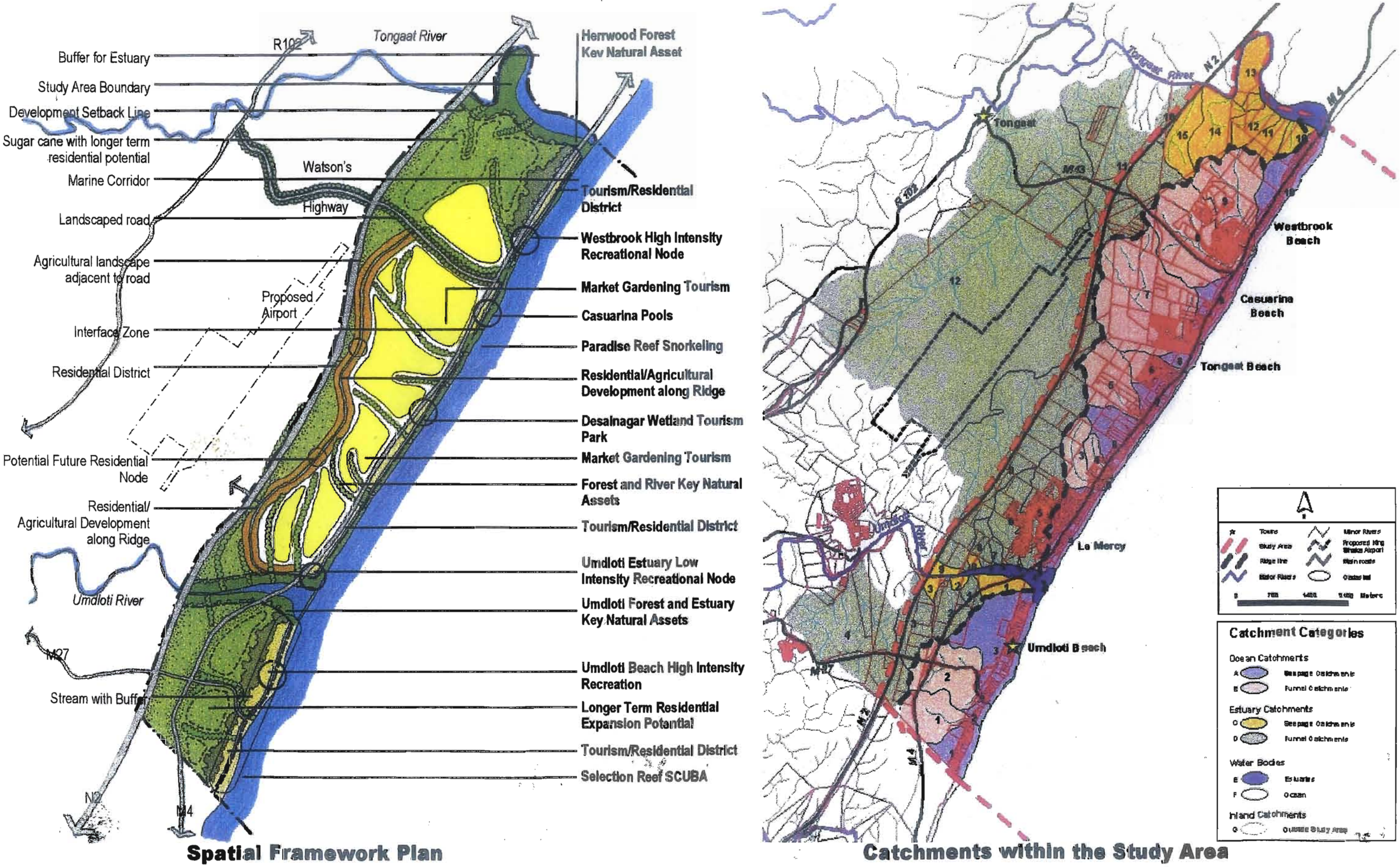


Figure 3.4 Sibaya Precinct proposed land use zoning (Sibaya Precinct agenda document, 2004)



Spatial Framework Plan — **Catchments within the Study Area**

Figure 3.5 Durban Metropolitan Area (DMA) Coastal Tourism Development Plan: Umdloti – Tongaat Study Area, Markewikz, *et al.*, (2000)

CHAPTER FOUR: RESEARCH METHODS

4.1 Research Methods and Approach

4.1.1 Site Visits

A series of site visits were undertaken in order to qualitatively assess the study area, its landscape characteristics, structure, land use patterns and emerging environmental impacts. The study area was documented with photographs.

4.1.2 Sampling Method

The sampling method used was the quota system – a non-probability method of sampling. This is a method of stratified sampling in which selection of respondents is non-random. People who meet the target numbers for the relevant characteristics are interviewed – broadly categorised as coastal stakeholders (hence the quota). This method ensures coverage of all sectors of the population, where selection of informants was decided by the researcher.

To this end, newspaper articles proved most valuable in indicating important stakeholders within the study area. Attendance registers (of IDP forums) obtained from the Ilembe District Municipality aided in identifying key stakeholders. Furthermore, the researcher attended two meetings initiated by the KwaZulu Natal Department of Environmental Affairs, Coastal Management Unit; on the 30th September 2004 and 26th October 2004, where the researcher met and arranged

meetings with stakeholders involved in coastal management.

The disadvantages of this type of sampling method are: the exclusion of people whose attitudes and opinions could differ from those questioned, hence compromising the representativity of the sample; and the researcher may take the path of least resistance such as avoiding unfriendly people. Despite these disadvantages, this type of sampling is focussed and easy to administer.

Respondents included key persons from the following categories:

- Developers
- Environmentalists
- Tourist concerns
- Community based organisations (ratepayers associations, residents, politicians)
- Coastal managers – local authorities, planners, CWGs and consultants

A sample of 10 respondents in each of the five categories was interviewed, resulting in a total sample of 50 respondents. A questionnaire survey was administered, on a face-to-face basis. Respondents were assured of the confidential nature of the responses. Each interview lasted approximately 45 minutes. Questionnaires comprised of both closed and open-ended questions as detailed responses were desired by the researcher. As a result, the interviews had to be recorded. None of the respondents were uncomfortable with this. One questionnaire was used, however, some questions applied only to a specific sector of the sample and these are indicated on the questionnaire.

Interviews were conducted over a five month period, due to time constraints; and meetings had to be set up depending on the availability of the respondents. Respondents were contacted via telephone to determine their willingness to participate in the research and to set up appointments. The general response of those interviewed was good – respondents were interested in the research and were eager to assist.

Data was analysed using Microsoft Excel. In analysing the data, verbatim responses from the respondents was used. Some details of the respondents were used to contextualise the responses without compromising the anonymity of the respondents. Opinions may vary as to the accuracy and appropriateness of the criticisms and compliments.

4.1.3 Participant Observation

The intention was to actively engage with stakeholders to assess: environmental and economic concerns, management issues, future development plans, etc. To this end, the researcher attended a Coastcare Induction Programme, hosted by the Institute of Natural Resources. This workshop ran from the 19 to 21 May 2004. This workshop proved most valuable as it engaged various group discussions about local coastal issues, in which the researcher also participated. Contact details of each participant were circulated and this has aided the researcher in networking with other coastal interest groups.

4.1.4 Policies

Policies applicable to the study area and development within the area were assessed. At present, legislation pertaining to the coast is highly fragmented. The White Paper incorporates much of coastal zone policies however it has not been adapted into a coastal policy document. Attempts to amend existing legislation are currently being reviewed – in the draft Coastal Management Bill.

4.1.5 Time Series

A time-series of land use changes in the study area was undertaken. Alder & Roessler (1964; cited in Hammond & McCullagh, 1974), define a time series as, successive or consecutive observations of the same phenomenon over a period of time. According to Anderson, *et al.,* (1976), one of the prime prerequisites for better use of land is information on existing land use patterns and changes in land use through time in order to determine better land use policies, to project transport and utility demand, future development pressure points and areas and to formulate effective regional plans.

Land use mapping incorporates four basic stages: initial field visits for land use identification, aerial photography interpretation, digitising of land use data, and both field and aerial photography verification for map accuracy assessments (Westinga, 1998; cited in Yemane, 2003).

Aerial photography (1:10 000), was obtained in digital version for the period 2003 (Department of Agriculture: Natural Resources Section) and 1983 (CSIR – Durban). These dates cover a span of 20 years.

4.1.5.1 Land Use/Cover Classification

Observations required to be arranged into groups using a classification system. According to Rhind & Hudson (1980), there is no ideal classification of 'land use' or 'land cover', and it is unlikely that one can ever be developed. Hence, there are different perspectives designed around specific user objectives in most classification systems, rendering them subjective. Furthermore, classification systems change over time.

An additional problem in land use classification is that of classifying multiple uses occurring in a single parcel of land (Anderson, *et al.*, 1976). Multiple uses can occur simultaneously, as in the case of agricultural land or forest being used for recreational activities (Rhind & Hudson, 1980).

In developing a classification system, every effort has been made to provide as much compatibility as possible with other classification systems currently being used by various departments involved in land use mapping in South Africa. The land use classification system used in this study is based on that defined by Thompson (1999) for South Africa. The South African classification system is a hierarchical framework designed to suit South African environments and to conform within internationally accepted standards (Thompson, 1999).

After a number of field visits and extensive literature review, land use/cover classes were identified. The first step was to distinguish between level I classification classes. The study area was found to comprise of the following land use/cover classes: forest, coastal grassland, commercial cultivation, other cultivated land, water bodies, wetlands and built – up land.

The next step was to classify level I classes into level II classes. At this level of classification, the South African Classification System was used with modifications to suit this study.

Forest vegetation was classified into coastal forest and thornveld, based on the classification of Acocks (1988) as no coastal forest data exists in the classification by Thompson (1999). Coastal forest and thornveld comprises typical coastal belt forest, dune forest and mangrove forest.

Coastal grasslands were classified into transformed and untransformed. The study area comprises grasslands growing under natural and semi – natural conditions (untransformed) and those that have been transformed, such as golf courses and recreation areas.

Commercial cultivation includes sugar cane and is the dominant form of commercial cultivation in the area. Other cultivated land was treated as a separate class and includes some small – scale forestry, and market gardening.

Water bodies were classified into river water (which also includes the estuaries). Wetlands are also s significant part of the study area and have been included as a separate class.

Built - up land was classified into residential, non – residential and transport routes. In this study, non – residential uses comprises commercial, office, and tourist development, which is significant to the area. In the Thompson (1999) classification, commercial activities are a class of their own and have a tourist component. The reason commercial and tourist development were included under the non – residential class in this study was because it was difficult to distinguish these activities from residential eg, a bed and breakfast (tourist concern) is likely to be located in a typically residential area. Transport corridors were classified separately and included road networks. Areas of sparse residential land uses such as farmsteads were included in the category to which it is related ie. residential.

4.1.5.2 Land Use/Cover Change Analysis

On-screen digitising was used to trace land use features for each year (1983 and 2003). Each set of aerial photographs were digitised separately using the Geographic Information System (GIS) software ArcView 3.2. Once the digitising was complete, it was necessary to close the arcs to form polygons of related land use classes. On – screen digitising is comfortable, accurate, quick and inexpensive (MiraMon, 2002; cited in Yemane, 2003).

Once the mapping of land uses was complete, the total area for each land use was calculated by running the summary function in ArcView 3.2. The summary tables were then exported to Microsoft Excel for further analysis and quantifying of data. The rate of change in each land use was calculated by dividing the difference between their respective areas (1983 and 2003) by the total area (5 534.05 ha) and displayed as a percentage.

4.4 Data Accuracy

Most analysis of land use data are predicted upon the belief that the data are correct, or at worst, sufficiently correct for conclusions drawn to stand (Rhind & Hudson, 1980). The land use data used in this research is believed to be correct and without any biases.

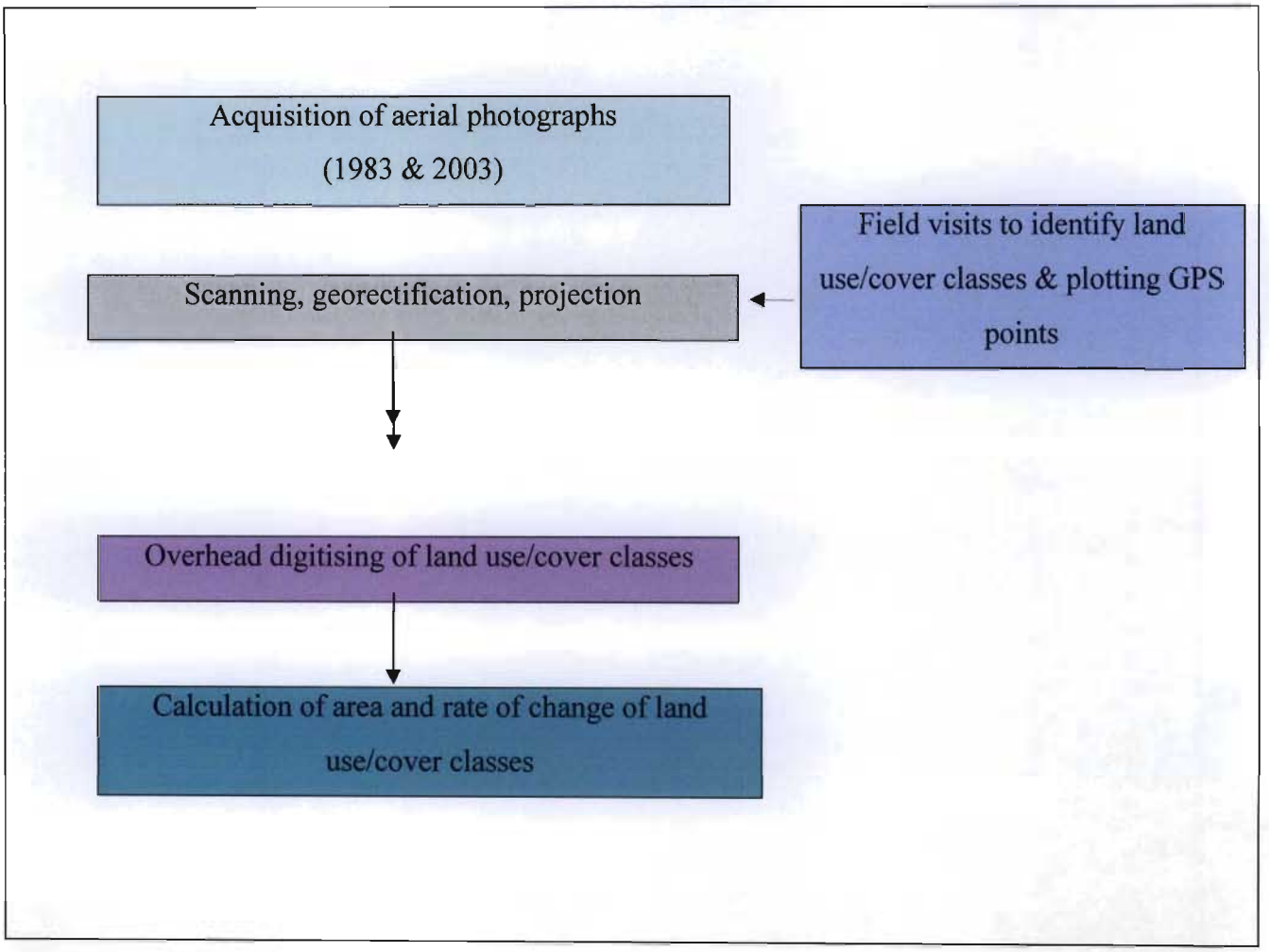


Figure 4.1 Steps followed in developing land use/cover classes

Table 4.1 Land use/cover classification

LEVEL I	LEVEL II	DESCRIPTION OF LAND USE/COVER
FOREST	Coastal Forest &Thornveld	Typical Coast-belt Forest, dune & mangrove forest
COASTAL GRASSLAND	Untransformed	Grass-like, non-woody, herbaceous plants – grassland biome – indigenous sp.
	Transformed	Planted grassland- eg. Golf courses
COMMERCIAL CULTIVATION	Sugar cane	Cultivated land under cane- permanent crop
OTHER CULTIVATED LAND	Cultivated land	Areas under crop, fallow/prepared for cultivation, small scale forestry
WATER BODIES	River water	Rivers – permanent open water area
WETLANDS	Wetlands	Natural/artificial areas where water level is near land surface – permanent/temporary basis
BUILT-UP LAND	Residential	Formal/informal residential
	Non-residential	Commercial/office/tourism development
	Transport corridors	Major and minor roads

CHAPTER FIVE: RESULTS AND DISCUSSION

5.1 Overall Development

5.1.1 Factors Driving Development

There is an interesting array of factors which are driving development within the study area. From a general perspective, its attraction lies in its proximity to the sea, its favourable climate, warm seas and abundant coastal vegetation. These physical features make the area a favourite all year round tourism spot.

The area is nicely located in terms of its proximity and access (M4 and N2) to the city of Durban. It is also the first port of call outside Durban (for tourists) on the north coast, before Zululand and the game reserves north. It has good water and electricity infrastructure, hotels, craft centres and crocodile farms which are also attractions.

There are a number of external pressures for the development of this area. The south coast has been developed to the extent that little developable land is left. According to Bulman (2004), land on the south coast has traditionally been owned in small parcels on the seaward side of the N2 and this limited the large scale type development which is now occurring on the north coast. Furthermore, concerns are that Umhlanga Rocks, which is immediately north of Durban, has reached development capacity. Since more vacant land is located north of Umhlanga Rocks, the development inertia is also moving northward.

According to Mather (2005), the biggest driver of development is land costs. Land owners with vacant land are penalized in terms of rates, because the municipality has always favoured a policy where it promotes development. So property owners try to minimize that cost by developing or selling the land to developers. "Agriculture is rated low in terms of rates, however, if that land gets residential, commercial or industrial zoning, then the rates start to bite and the people want to offload their properties" (Mather, 2005).

The 2010 soccer world cup bid awarded to South Africa is another driver of development. Within the study area, the 2010 bid is part and parcel of the KwaZulu – Natal Provincial Growth and Development Strategy aimed at poverty reduction, employment creation and building the economy through competitive investment and development programmes. The tourism agenda is certainly high on the agenda with regard to the study area. Some of the proposed tourism development includes: the proposed international airport and Dube Trade Port. A lot of the tourism development gearing towards 2010 has involved Moreland – Zimbali and the proposed Zimbali Lakes projects and the proposed Sibaya Precinct development.

The reason for including Moreland is probably because of their excellent international marketing experience. According to Attwood (2004), the investment by Kuwaiti based International Financial Advisors (IFA), when it purchased 50% of Zimbali, is the largest foreign transaction in South African tourism to date. The international marketing platform accessed by IFA Hotels and Resorts, and the 'tapping' of their global client base, has exposed the Zimbali Coastal Resort to larger international markets (Daily News Reporter, 2004). Furthermore, IFA's acquisition of the five star

Zimbali Lodge and their strategic alliance with Sun International in Zimbali, Zanzibar and on the Palm, Jumeirah, in Dubai, further cements their ties with the southern African tourist and purchasing market (Daily News Reporter, 2004).

Several economic factors are also responsible for driving development. In the latter half of 2004, the South African Reserve Bank cut the repo rate by 50 basis points, and indications are that further cuts are expected. This puts more money into the consumer's pockets. Interest rates cuts create a positive outlook for inflation – lower interest rates bring down bond instalment repayments, making property more affordable, especially at the lower end of the consumer market. Furthermore, as repayments fall, growth in property remains high. The strength of the rand, which gained by 6% against the US dollar in 2004 is another factor making property more affordable.

Lastly, economic confidence in South Africa is on the rise, and especially so in the KwaZulu – Natal property market, with a large portion of the study area gaining a dominant role as the gateway to tourism in southern Africa.

5.1.2 Time Series Analysis of Development in the Study Area

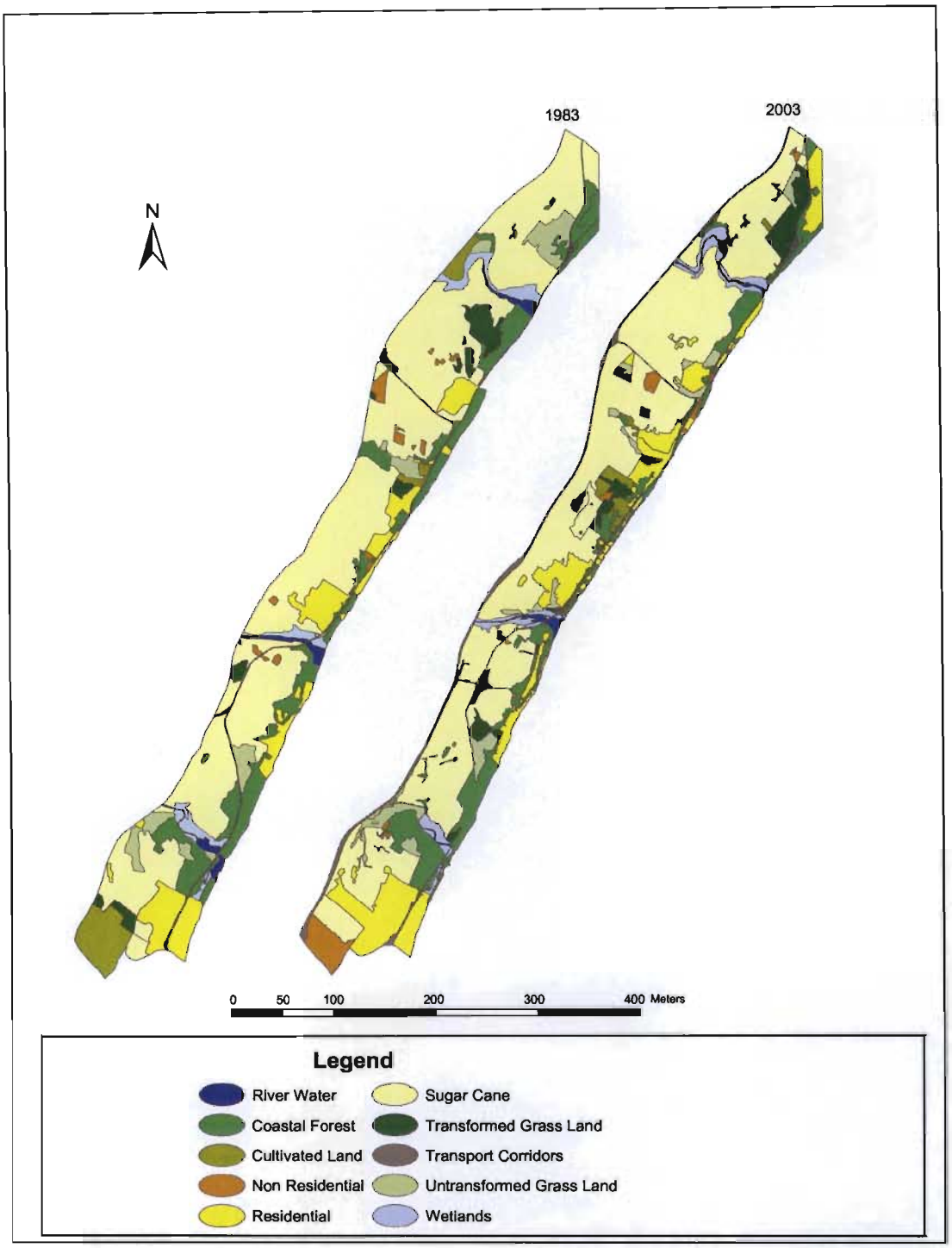


Figure 5.1 Comparative land uses in the study area for a period of 20 years, with a 10 year interval (1983 and 2003)

Figure 5.1 above provides a comparative visualization of land use changes in the study area for 1983 and 2003 respectively, covering a period of two decades. This time series analysis was produced by digitizing information off 1: 10 000 aerial photography, into the GIS software ArcView 3.2. This information is tabulated in Table 5.1 and presented graphically in Figure 5.2 and Figure 5.3 below.

Settlement patterns within the study area are occurring in an *ad hoc* fashion resulting in sprawl type development. Residential areas are generally isolated and physically separated from one another, whilst the beach strip is intensely developed as a ribbon of development, broken only where natural barriers occur.

While there have been significant levels of development within the study area - 16.5% (906.82 ha) in 1983 and 26% (1 424.08 ha) in 2003 respectively, they are still comparatively lower compared to the development of urban centres within the sub – region surrounding the study area.

The original sub-divisional pattern of land use reflects large parcels of agricultural land. Superimposed upon these were the major transport routes (M4 and N2). On either side of the M4, residential development resulted in further sub-divisions for detached dwellings and multi-storey flats and hotels (Markewikz, *et al.*, 2000). As these were organized along transport routes, it resulted in suburban patterns of development (Markewikz, *et al.*, 2000). The ad hoc nature of development resulted due to the subdivision of large pieces of land for township development which had little regard for secondary linkages between developments. This has led to the

fragmented sub-divisional pattern with poor linkages between residential areas and between major transport routes (Markewikz, *et al.*, 2000).

Settlement within the study area is also increasing the amount of coastline being committed to development, resulting in land with beach frontage and sea views becoming increasingly scarce. Importantly, on this coastline, beach frontage could imply extending development into primary and secondary dunes, coastal forest and estuaries (and this is indeed the case).

Table 5.1 Summary aerial coverage and percentages of level II land use/cover classes

Land use	Area 1983 (ha)	%	Area 2003 (ha)	%	Difference (ha)	Rate (%)
Coastal forest	786.38	14	641.11	12	145.27	3
Cultivated land	227.88	4	68.72	1	159.16	3
Non-residential	60.24	1	157.20	3	97.2	2
Residential	589.11	11	787.55	14	198.44	4
River water	91.96	2	56.99	1	34.97	1
Sugar cane	3094.43	56	2944.31	53	150.12	3
Transformed grassland	189.44	3	283.35	5	93.91	2
Transport Corridors	68.03	1	195.98	4	127.95	2
Untransformed grassland	261.91	5	210.24	4	51.67	1
Wetland	164.67	3	188.60	4	23.93	0.43

Total Area = 5 534.05 ha

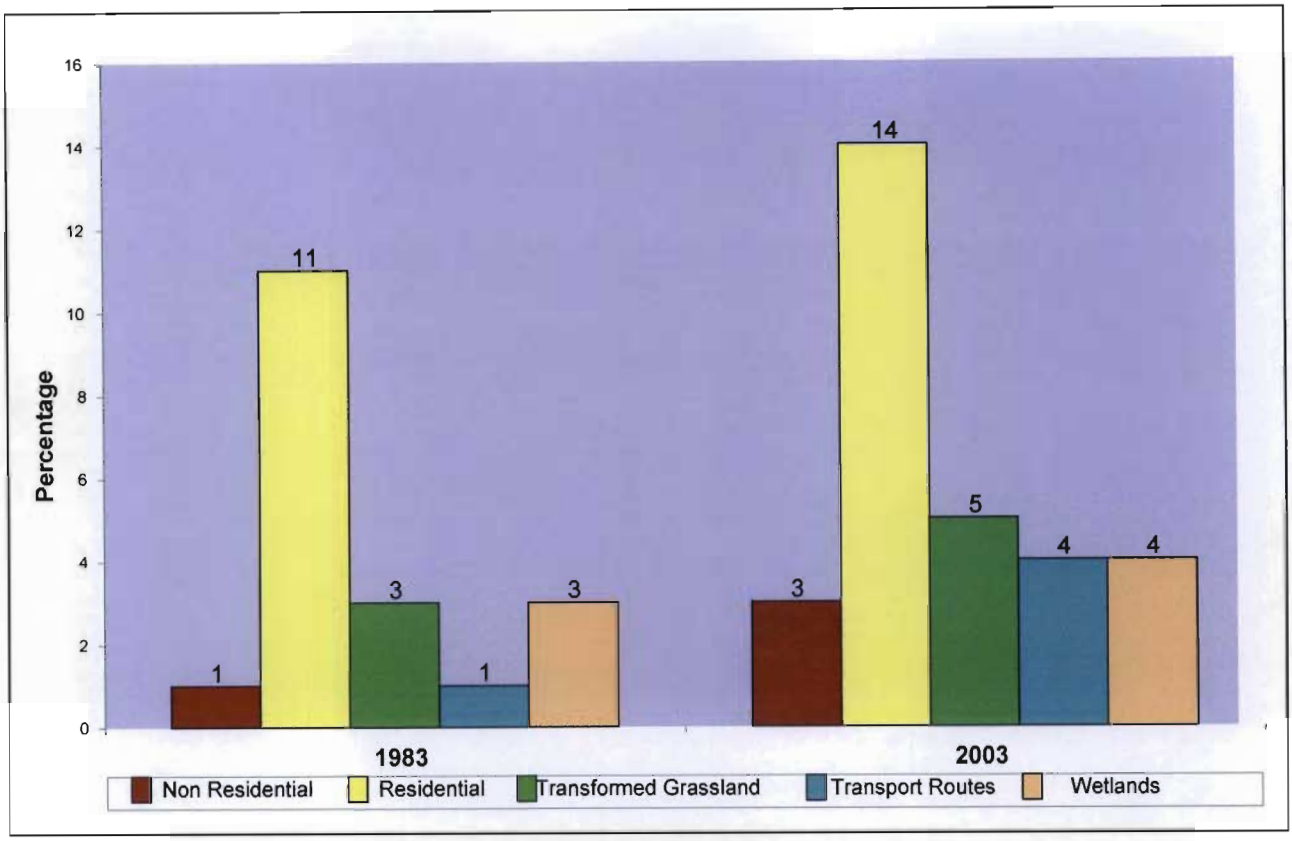


Figure 5.2 Percentage of land use classes showing increasing rates of change

Prior to the mid-1990s, the study area served primarily as small residential and seasonal holiday towns. The economy was based on agricultural production of sugar cane which occupied 3094.43 ha (56% of the study area) in 1983. Residents often commuted to places of work and shopping. To date, there has been no significant industry in the area, hence enhancing its 'pristine' quality.

Residential development has increased by 4% (198.44 ha) due to the demand for this type of land use. There has been a corresponding upsurge in the non-residential (commercial/office/tourism) sectors, by 2% (96.96 ha). Within the last two years, growth on this coastline has been spectacular, with the proliferation of development at strategic nodes: offices (Umhlanga Ridge), huge shopping centres (Gateway Theatre of Shopping at Umhlanga Rocks and the Lifestyle Centre at Ballito), the Sibaya

casino at Umdloti and the proposed King Shaka international airport and adjacent Dube Trade Port at La Mercy.

Plate 2: Gateway Theatre of Shopping

Plate 3: Sibaya Casino at Umdloti

Plate 4: Lifestyle Centre at Ballito

These big developments are generating demand for more development. In the residential sector, certainly, many people are now locally employed and require accommodation and related services. According to Mather (2005), there are approximately 17 000 units to come up on stream within the next two years.

Plate 5: Apartment development adjacent to the Gateway Shopping complex

As more land is committed to development, so is its infrastructural needs. There has been a 2% (127.95 ha) increase in transport corridors.

The mid-to-late 1990s saw the beginning of a new trend in the residential –cum-tourist component of the study area – the concept of gated estates, golf estates and recently, eco-estates. The first of these was the Zimbali golf and eco-state developed by Moreland Development. The principle of this type of development is that it offers safety and blends development with the tranquillity of natural areas. It was a concept that was noticed and taken up by many other developers. These are large estates (300-400 ha) and often include a component of golf courses. This is probably the reason for the 2% (93.91 ha) increase in the amount of transformed grasslands in the study area.

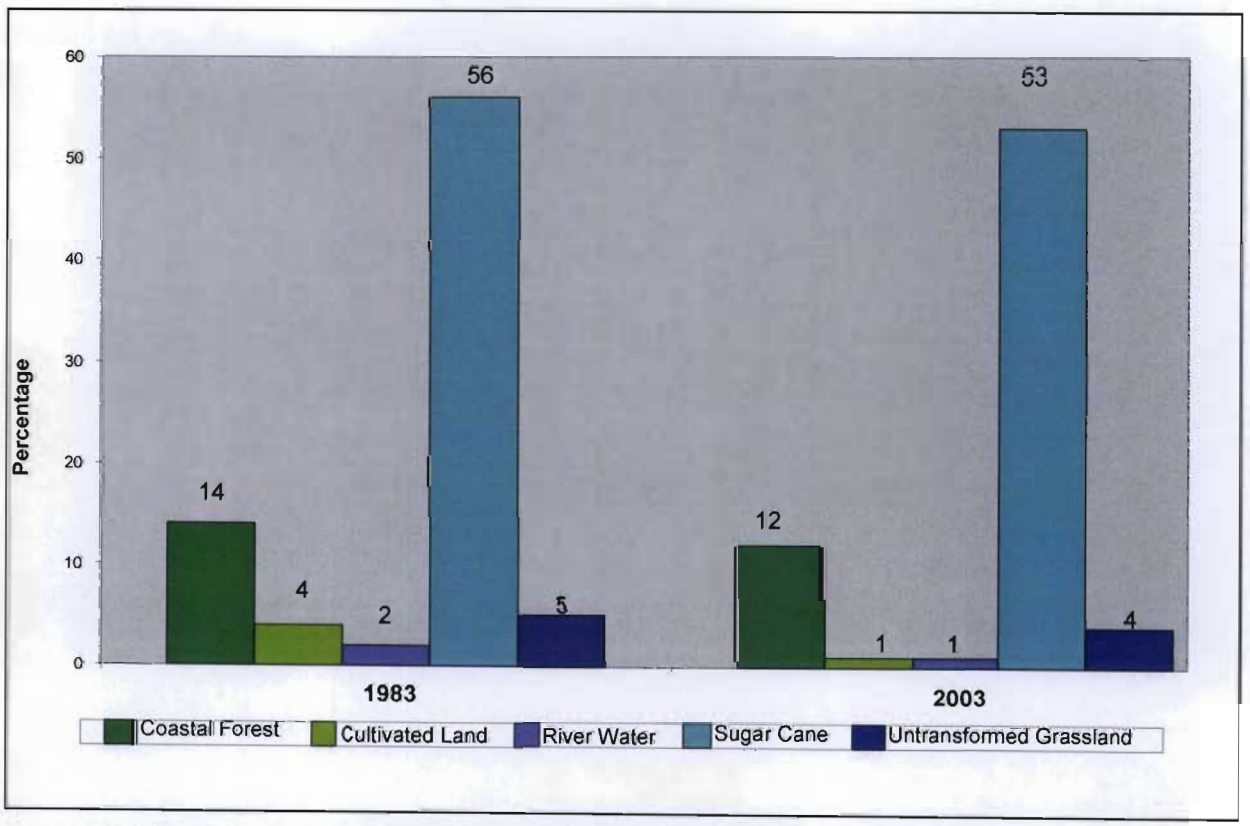


Figure 5.3 Percentage of land use classes showing decreasing rates of change

Development patterns have had significant negative impacts on the landscape of the study area. The percentage of coastal forest (including dune vegetation) has decreased by 3% (145.27 ha). The removal of natural vegetation has led to increased runoff. This, combined with steep topography and highly erodable soils such as Berea Red

sands, has led to severe erosion problems and the siltation of rivers. There has been a corresponding decrease in the percentage coverage of rivers by 1% (34.97 ha). Cultivated land and sugar cane have both decreased by 3% respectively (cultivated land by 159.16 ha and sugar cane by 150.12 ha). This is because agriculture is rated low, and property development is more lucrative. Untransformed grasslands have decreased by 1% (51.67 ha) probably due to habitat destruction from development activities.

5.1.3 Objectives of Sustainable Development within the Study Area

Table 5.2 Stakeholder Perceptions on the Objectives of Sustainable Development within the Study Area

% Stakeholder Sectors	Compromising	Contributing	Unsure
Tourist	30	60	10
Environmental	80	20	0
Municipality	60	40	0
CBOs	70	10	20
Developers	40	50	10
% of Total Sample	**56**	**36**	**8**

Table 5.2 outlines the perceptions of various stakeholder sectors regarding the objectives of sustainable development within the study area, as set out in the White Paper for Sustainable Coastal Development in South Africa.

Of the total sample, 56% felt that development is not contributing to the objectives of sustainable development as set out in the White Paper. Granted, the use of the coast and its resources for the development and benefit of human communities, while at the

same time preserving the functioning and ecological diversity of ecosystems is what most would like to see take place, is not always happening. The speed at which this coastline is being developed in a ribbon fashion is raising serious concerns about the sustainability of the natural ecosystems.

"Sustainability, to me, means sustaining development" (Female, White, Resident).

Furthermore, the 'way it is being developed' is not to the benefit of all. Respondents raised issues regarding the highly skewed nature of development that enriches the rich and marginalises the poor. Municipalities are desperately trying to draw linkages between the two. The lack of enough public access to the coastline by different groups (primarily the marginalised) due to the intensive development of the beach strip is also of concern.

"The Zimbali development is a case in point, where 'privatisation' of a large strip of beach has denied access to that particular beach" (Female, White, Planner).

Plate 6: Zimbali Coastal Resort – covering some 700 ha of coastline (www.zimbali.co.za)

According to some, beach privatisation is a common phenomenon overseas. However, these first world trends are not acceptable in a third world country like South Africa. Furthermore, a large chunk of the study area is owned by Moreland and therefore development is dependent on Moreland, and questions are being raised as to how effective the public sector can be in undertaking development in a way that is sustainable.

"Moreland has told me they are not concerned about the environment...their aim is to make a profit out of the development process" (Male, White, Municipal Manager).

A few respondents felt that the tourism industry in the area was not contributing to true sustainable development because of its narrow focus ie. very few people benefit such as tour operators and hotels owners. Furthermore, jobs generated from the industry creates seasonal jobs at best and these are mostly confined to cleaners, hawkers, gardeners – 'wage servants'- and not empowering people or transferring any marketable skills. Although some projects have been awarded to Black Economic Empowerment groups, respondents are concerned that this BEE sector does not reflect a local component.

"Most so called BEE groups are actually fronts for the privileged sectors of the population and does not benefit local people" (Female, White, CBO)

Those respondents that felt that the development is contributing to sustainable development (36%), mainly highlighted that (contrary to what the previous set of

respondents claim) the development process is generating thousands of temporary and permanent jobs, literally per project. These respondents also maintain that strict EIA procedures were adhered to when undertaking development projects, so concern for the environment was always at the fore.

Eight percent of the respondents were unsure whether the objectives of the White Paper were being met. The reasons are that while efforts are being made, for example, with Sustainable Coastal Livelihoods (SCL) projects, there exists no scorecard at present to determine whether the objectives have been met or not. There are no SCL projects in the study area however, Ilembe has the highest number of projects - the Vertiver Grass Project (five sites within Ilembe), the Twin Estuaries Project at the Amatikulu Nature Reserve and the Historic Thukela Project. All these projects have a sustainability focus. They differ from the DEAT Poverty Relief projects such as the Working for the Coast programme. The latter have a specific time frame in mind and provide temporary jobs eg. clearing alien vegetation, beach clean ups. Once these projects come to an end, so does the employment. SCLPs are based on capacity building, upgrading/rehabilitating coastal assets, training people in business management so they can run the projects themselves at the end. The intention is that these projects will provide sustainable incomes, so the benefits translate to the next generation.

5.1.4 Land Ownership in the Study Area

Land ownership maps for the northern portion of the study area (Ballito and Salt Rock were obtained from the Ilembe District municipality (Appendix IV). No maps were available for the eThekwini portion of the study area.

There are a wide variety of land owners in the study area, with the majority of coastal land held in private ownership. The majority of private land is owned, in large parcels, by Moreland (Mather, 2005). The major issues with private land ownership are:

- It does not allow municipal planning much leeway in negotiating development in terms of the release of land in appropriate locations and at appropriate times
- Private land owners tend to seek short-term gains from developing/selling land for development, with little consideration of the overall structure of the area
- Profits generated from development would go to specific user groups and does not allow the gains to filter to other groups
- There is no control over the price of land or target market for development, as it is determined solely by the developer

The ownership patterns in the residential property sector indicate that ownership has changed from absentee to occupancy. This is due to the change in the nature of residential areas, from dormitory and vacation towns to fully serviced residential and commercial centres. The target market for general development is:

- high income
- single professionals
- retired people – there are a number of retirement homes in the area
- foreigners

The problems that have surfaced in this regard are that property is being priced out of the market of first-time home owners, and there exists a clear international bias. Excellent marketing campaigns have aided in targeting these sectors.

5. 1.5 Land Use within the Study Area

Table 5.3 Evaluation of land use within the study area

	MAIN LAND USAGE						
	Recreation	Agriculture	Residential	Transport	Shop/office	Hotels/Holiday Flats	Natural O/Space
% survey sample	**o/s A u/s**	**o/s A u/s**	**o/s A u/s**	**o/s A u/s**	**o/s A u/s**	**o/s A u/s**	**o/s A u/s**
Tourism	0 10 90	70 10 20	20 0 80	0 40 60	0 30 70	0 10 90	0 40 60
Environ	0 20 80	60 40 0	60 40 0	0 90 10	50 50 0	20 40 40	0 0 100
Developer	0 10 90	90 10 0	10 20 70	0 60 40	40 40 20	0 10 90	0 60 40
Managers	0 0 100	70 20 10	10 50 50	0 60 40	70 30 10	O 10 90	0 10 90
CBOs	0 20 80	60 30 10	30 60 10	0 70 30	50 50 0	20 30 50	0 20 80
%Total sample	12 **88**	**70** 22 8	26 34 **42**	**64** 36	**42** 40 20	8 20 **72**	26 **74**

O/S = oversupply
U/S = undersupply
A = appropriate levels of development

The evaluation of land use within the study area (Table 5.3), revealed that, in general, all groups (total sample) indicated an oversupply of agricultural land (70%), and shops/offices (42%) and an undersupply of recreation (88%), residential (42%), hotels and holiday flats (72%) and natural open space (74%). Transport routes are the only land use in appropriate supply (64%). There appears to be a general pro-growth sentiment in the study area, however this growth is expected (and currently is) occurring against a threatened natural resource base.

Recreation is seen to be in short supply with respect to the lack of safe swimming beaches (particularly between La Mercy and Westbrook), lack of facilities and infrastructure at beaches, lack of land adjacent to the beach and poor water quality. Tourism currently relies on recreational tourism – passive pursuits such as swimming, fishing, picnicking. However, tourism trends internationally indicate a move towards more active pursuits such as exposure to local society and culture, eco-tourism, nature-based tourism and adventure tourism. In this regard, respondents feel that the tourism potential of the area has not been fully 'exploited'.

Residential undersupply relates to the fact that demand is far exceeding supply in the high income sectors. Some respondents raised concerns that there is a lack of affordable housing for middle and low income sectors of the population and this was reinforcing racism and classism on this coastline. In this regard, the National Housing minister announced, in May 2005, that reforms are in place to change the face of exclusive housing estates, requiring developers to include low cost housing in their future projects. Development types that could be affected are Zimbali, among other golf and eco-estates.

Hotels and holiday flats were considered to be in short supply, especially quality hotels and accommodation with five star rating. Trends in accommodation indicate a growth of clientele in the following type of accommodation: hotel accommodation, non-hotel (luxury country style house hotels) which is gaining momentum, bed and breakfast, conference/convention and casinos. A recent study conducted by KZN Tourism indicates a need for five of these. Moreland's proposed three sites are needed. Activities such as the soccer world cup are making municipalities look at

what their needs are in terms of accommodating these and other tourists. The new airport is also expected to hold an international component and development is gearing around these activities and developments.

"Given the tourism boom, and influx of foreign visitors, the demand for luxury accommodation is likely to remain". (Male, Indian, Tourist organisation)

Respondents have also stated that there is a shortage of capacity (bedstock) during peak tourist seasons and this will have to undergo growth not only because of increases in foreign tourists but also from population increases within the country, increasing disposable incomes, increased leisure time and good media coverage.

Natural open space is in short supply. Currently, with the amount of development coming up, and that tourism trends indicate a focus on natural areas, whatever remains of these needs to be carefully managed.

Agriculture is considered to be in on oversupply. However, some are at a crossroads over whether agriculture should be retained or not. The agricultural side of DAEA has concerns about loss of crop production, high value agricultural land and the consideration that agricultural land could become so scarce that its agricultural value may exceed the value of other uses. Furthermore, one of the ideas around the Dube Trade Port is to export fresh produce to Europe and if that comes about, agricultural land will be in demand.

Shops and offices are seen to be in oversupply. Based on crucial statements of a few respondents, most office space is vacant however, developers do not advertise that. The perception is that there is occupancy. Respondents spoke about congestion problems relating to the number of people now coming into previously residential areas. Furthermore, shops and offices that are evolving into new town centres (at Gateway and Ballito Junction), are driven by private developers and some are of the opinion that (in the case of the town centre at Gateway) more space was taken for private development and very little for the actual town centre.

Transport was found to be at appropriate levels and there were no major capacity problems were highlighted. However, this could change if the new airport comes up.

5.2.5 Likes/dislikes about Growth and Development in the Study Area

An assessment of the attitudes of respondents regarding growth and development in the study area revealed that 84% of the total sample stated that they disliked the *ad hoc* nature of development that is taking place at an unprecedented rate, and with total disregard for environmental considerations. Municipalities were criticised for lack of capacity, expertise and experience to deal with monitoring development and bringing offenders to task.

"This ribbon type development has little strategic planning ...people are out to make money ....a lot of speculation is occurring (Male, Indian, Manager).

Of the total sample, 70% stated that they disliked the fact that development is far exceeding infrastructural capacities. The most common issue pertained to water and sanitation. Current sewer systems are unable to cope with the large number of properties being built and existing systems are already reaching capacity. The Ilembe municipality has amended their five year plan to build new sewer works to cater for some of the development. The eTthekwini municipality is facing problems with sewer in the Mhlanga estuary. They have had to put in a sewer bypass system to pump sewer back into the Umgeni River, simply to allow for the additional development Moreland is proposing to bring onto the market to be viable (Sibaya Precinct). The bypass system cost approximately R 25 million.

Fourteen percent of the total sample stated that they disliked the apparent 'monopoly' of development taking place. Moreland has come under immense criticism and scrutiny. Comments revolve around the fact that since they own extensive land, and have done a lot of planning themselves and a lot of it has been in isolation of the municipality.

"They (Moreland) see themselves as the Local authority because they own such a lot of land and that's not necessarily in the best interests of the City. It's certainly in the best interests of Moreland because it gives them highest returns, and that is the biggest factor that has been not so nice to live with" (White, Male, Manager).

"Many of KwaZulu - Natal's forests have been cleared for sugar cane...Moreland has an ecological debt to pay ....they (Moreland) have told us that they don't care

about conserving forests as long as they make a profit" (White, Male, Environmental Group).

Twenty percent of the sample stated that the area's sense of place is being eroded by foreign looking architecture based on places like Bali, Dubai, Europe and Spain. There is also visual pollution – high-rise buildings, bright lights etc.

Thirty percent stated that they liked the development arena as it has increased returns on their investments. A further 30% stated that the development boom would create many employment opportunities and would attract foreign investment.

5.2 Legislation Aspects of the Study Area

5.2.1 Conflicts/Constraints in Legislation

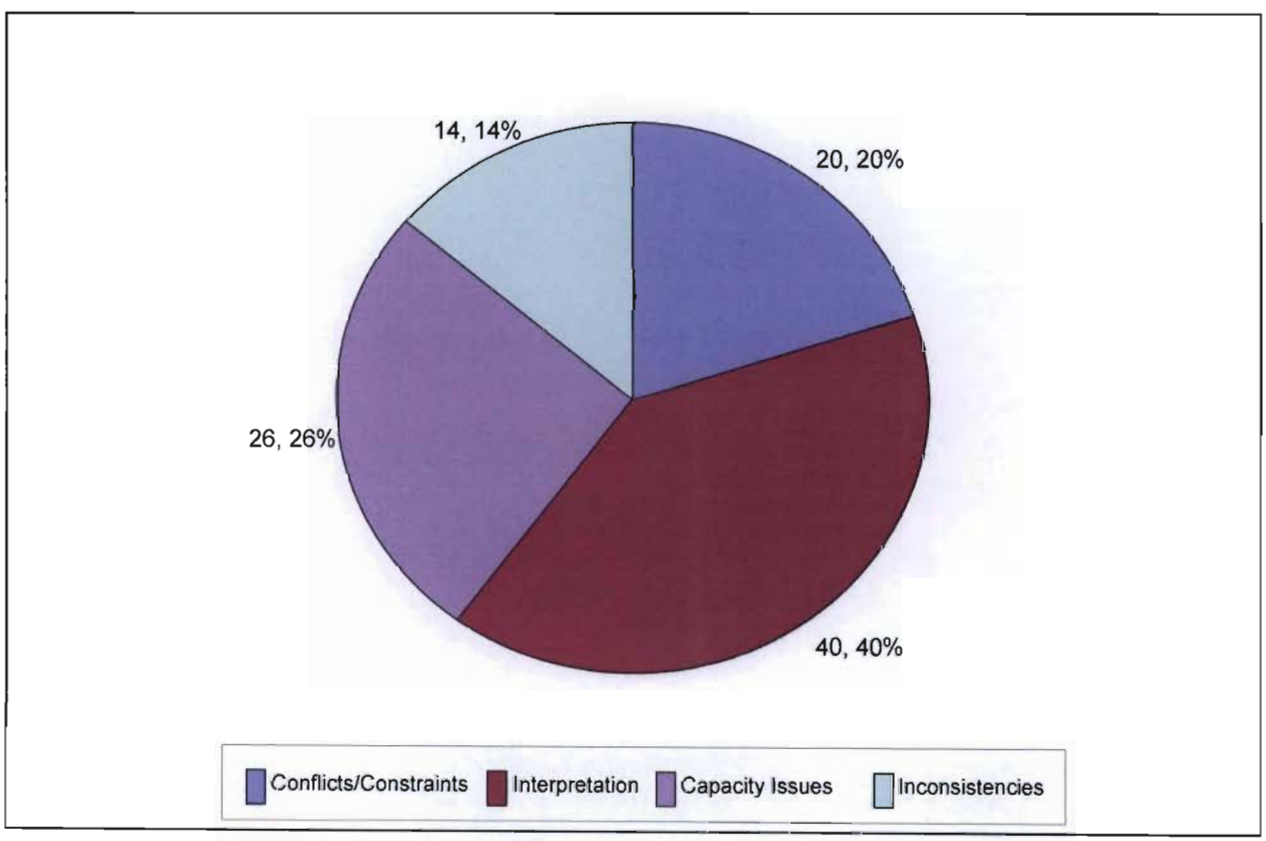


Figure 5.4 Conflicts/constraints in legislation

Some of the recurring legislation cited by respondents was: NEMA, the Town Planning Ordinance No. 27 of 1949, the DFA, IDPs, bylaws, the Biodiversity Bill and the EIA processes. Legislation pertaining to the coastal zone has become extremely complex due to the introduction of new legislative processes and amendments. A lot of coastal specific legislation, such as a National Coastal Zone Management policy and Provincial Coastal Management policy has not been finalised, and in the absence of a National Coastal Zone Management Act, development can best be guided but cannot be controlled or managed effectively.

Twenty percent of the total sample stated that there were inherent conflicts and constraints in legislation. Some of the areas of conflict stated by respondents are that there is a dual process between planning and development legislation and environmental legislation. Stakeholders alluded to the apparent conflict between the NEMA and the Ordinance.

While NEMA promulgates that nothing should occur that is detrimental to the environment, and duty of care, the Ordinance came into existence (has not changed) before the environment was a consideration and at a time when resources were more. Furthermore, town planning sanctions whether development goes ahead or not, and not NEMA. Hence, environmental legislation would allow for certain things that do not link up with planning. The KwaZulu – Natal Planning and Development Act of 1999, which was due to come into operation in 2001, would have provided additional dimensions to land development procedures and replace the Ordinance, however it has not yet been enacted.

"The way planning is done, has nothing to do with the environment" (Indian, Female, Planner).

Developers can choose between the Ordinance route to develop or the DFA route. In the Ordinance route, the developer is required to prove 'need and desirability' for the proposed development from the general public's perspective. The DFA does not require proof of 'need'.

The speed at which projects are given sanction is also problematic. It takes approximately 60-120 days for the DFA Tribunal to reach a decision. It tends to go through a lot of processes in a very rapid manner. There is also the perception that the DFA is intended solely for RDP projects. This perception has been challenged. The Development Tribunal held the view that RDP projects specifically was not the intention of the DFA, however, this was overturned by the Appeal Tribunal. And yet, there are many projects taking the DFA route.

"Most of the development going the DFA route is not a 'need', it is a want, driven by greed...legislation bends over backwards to help developers...a lot of development resulting in high income squatting" (White, Female, Environmental Group).

"The DFA is enriching the rich" (Black, Male, CBO).

IDPs have been criticised for not gainfully including environmental considerations. Several respondents are calling for a link between the IDP and SEA for more meaningful management. EIAs have been criticised for the lack of considering impacts beyond the footprint of the activity. Furthermore, respondents feel that the

consultant's assessments are sometimes not independent of the salary being paid by the developer.

Of the total respondents, 40% stated that there was no conflict between various legislation however there are conflicts in interpretation, application and implementation of the legislation. It appears that uncertainty exists among different departments as to which issues take precedence.

"*KZN Wildlife advises DAEA on biodiversity impacts of development but they often do not take our advice. Our interpretations are in terms of the Biodiversity Bill and NEMA, while they have tended to side with the developer instead of the biodiversity criteria we want to implement*" (White, Male, KZN Wildlife).

There also exists confusion in the permission granting process. Land use change and the breaking of new ground requires the permission of two departments within DAEA – sub-department of environment and the sub-department of agriculture. It is stated by a few respondents that agricultural permission is given before environmental permission and by the time the application goes through the environmental process, land has already been transformed and its value lost.

Twenty six percent stated that legislation is not effective due to capacity issues within departments and organisations involved in the development process. Respondents have stated that there is lack of expertise in the public sector throughout the province.

Some respondents have stated there is also a lack of expertise in the consulting arena, with too many generalists and not enough specialists, hence the ineffective coverage of Red Data Species among other things. Red Data Species are difficult to identify especially in winter and are poorly known (except by experts) and are generally overlooked by consultants. Most private consultants work with small budgets and have three months to comment. Time and financial constraints do not allow for the deferment of projects to ensure the coverage of these species. The environment does not respond to the developer's time frame and important environmental aspects pertaining to seasonal variation is not effectively considered.

There is also lack of capacity in numbers, for example, KZN Wildlife has only two people to evaluate all EIAs in the province. There is also a shortage of expertise and numbers of compliance officers in municipalities. There are also shortages in building inspectors with an environmental focus.

Fourteen percent stated that there are too many departments dealing with a specific natural resource issue, and conflicts arise out of jurisdictional limits, duplication of information and inconsistencies. For example, the Department of Minerals and Energy, DWAF and DAEA are all responsible for water management in estuaries. However, there is conflict over which department has authority and up to what point. The Department of Public Works (responsible for the administration of the Admiralty Reserve) also has jurisdiction in estuaries. Furthermore, all these departments have capacity issues.

5.2.2 Instruments for Regulating Land Use

The managers of land use are the local authorities. The instruments that respondents spoke about were zoning, and schemes.

A number of problems exist with regard to current zoning and schemes. Firstly, what is emerging in the study area is the realisation that municipalities are operating with outdated zoning and schemes which do not consider holistic planning implications and is therefore an inappropriate tool for managing growth.

"Zoning of this area was determined historically as 'ribbon/strip' development following along the coastline and takes no cognisance of the environmental constraints inherent in that zone" (Indian, Male, Planner).

This outdated zoning is difficult to undo. Mather (2005) highlights two arguments in this regard: on the one hand, if land is undeveloped and the owner has not taken up development rights in terms of existing zoning, then he has not lost anything and the land can be rezoned. However, if the developer claims he bought the site thinking he can develop the whole site but now finds he has environmental constraints, it becomes problematic. The eThekwini municipality is currently looking at options about what it can and cannot do in terms of regulating land use in terms of zoning.

Another issue raised was that land on the beach has gone from public to private, and if that land has residential zoning rights, then the owner will expect to build on the beach, as is the case for most of this coastline. Questions are being raised as to

whether municipalities have been acting in the public's best interests. While it may be possible to pay people to change zoning, cash-strapped municipalities do not have the money.

According to a respondent at DAEA (provincial lead agent), it will be mandated, in terms of the Draft Coastal Management Bill, to conduct a LUMP for the KwaZulu – Natal coastline in an attempt to adopt a strategic focus on development. However, they are at least five years away from that Plan, and five years may be too late to prevent bad land use.

5.2.3 Non-compliance Issues

The following non-compliance issues came up most frequently among the respondents:

- Removal of vegetation on private properties for better sea views. This is an infringement of the Forestry Act.
- The extraction of water from rivers by developers. They have permits for this but are exceeding these limits.
- Form of development exceeding maximum building coverage, illegal buildings and building seaward of the building control lines.
- Lack of follow-up and adherence to EMPs. This is of particular concern in tourist areas where some developers conserve those bits of the environment that are tourist attractions and do not take a holistic view of preserving ecosystem functioning, hence ignoring cumulative impacts.

The reasons for non-compliance are: punishment is less severe than going through proper processes. There is a shortage of environmental lawyers in South Africa to defend the environment. There is little legal status of environmental groups. There is lack of monitoring and compliance capacity in the public sector. DAEA is currently trying to step up their compliance section by decentralising this function to district councils. Furthermore, there exists a poor land ethic in this country, where private ownership is driven by greed and land owners feel they can do whatever they want to with the land.

5.3 Stakeholder Participation

5.3.1 Opportunities for Participation

Table 5.4 Opportunities for participation in the development process

Inadequate	Satisfactory	Good	Very Good	Total sample
42%	28%	20%	10%	50

Of the total respondents, 42% stated that their opportunity for participation in the development process is inadequate. The reasons for this are that there is lack of genuine stakeholder participation, lack of transparency, stakeholders do not have enough time to comment on proposals and they require more information, and that political decisions and more affluent lobbies hold the final sway in decision-making. Ironically, if there is no political buying into policy, then noting happens.

Another issue that was raised was that of apparent racism over the municipality's sanctioning development by White developers and imposing restrictions on Indian developers in the La Mercy beach area.

"There is a lack of genuine public scoping exercises.....EIAs are a farce" (White, Female, Environmental Group).

"Public participation has become a ritual rather than meaningful" (White, Male, Consultant).

"From a private developer point of view there is no stakeholder participation....stakeholders find out about development from the grapevine and not any formal public participation process" (White, Male, Environmental Group).

"Politicians hold a lot of sway at the municipal level" (Indian, Male, Manager).

Of the total sample, 20-28% stated that participation was satisfactory to good. The reasons given by these groups of respondents were similar. New structures such as CWGs are in place that will improve and encourage participation. Furthermore, there are representatives from provincial departments such as DWAF and DAEA who sit in on CWG meetings, so this improves communication between local and provincial bodies.

5.3.2 Success of Environmental Groups

The general consensus is that while environmental groups are highly active in the area and have good networks between them, they are not heard very well. They are financially constrained as to their ability to take developers to court. Another concern

expressed by respondents is that people have become apathetic towards conservancies, and they are viewed by many as anti-development.

5.4 The Environment within the Study Area

5.4.1 Revenue Counterbalanced with Environmental Management

The majority of responses (over 50%) ranged from comments that revenue generated from general development and tourism was not being counterbalanced with environmental management at all or not to the extent that it should be.

The eThekwini municipality is currently looking at environmental servitudes, where the land owner will donate a portion of his land to a servitude still registered in his name, and he gets rates relief on that particular piece of land. People are trying to reduce their outflow on the property and they pay underdeveloped rates for a natural area and this is actually not fair on them because they are actually conserving the environment and they have to pay a penalty for it. At the Umhlanga node (Sibaya Precinct), the municipality is trying to set up a Trust which the land will go into and there will be a levy on residential areas particularly around the green area.

Comments from the Ilembe municipality were that the region gets revenue from tourism and not the municipality hence it was difficult to say exactly how the money was being counterbalanced with environmental management.

5.4.2 Developer Contribution to Biodiversity Conservation

The common responses included: the use of landscaping to preserve biodiversity such as the creation of dams and ponds in projects. These are created to enhance existing wetlands on site, to provide engineering roles, attenuation facilities to cater for post-development stormwater runoff that causes erosion. These water features are responsible for attracting birdlife. Many claim that because development is occurring on disturbed sites, the net vegetation post development is greater. However, some environmental groups feel that that landscaping is a way of actually window dressing the failure to truly conserve ecosystems.

The Zimbali Estate Management have strict regulations that no trees, shrubs or grasses may be removed, destroyed or pruned without full permission of the estate management and breach of this could have a fine of R1 000 per tree, shrub or branch imposed on the offender (Kitchen, 2004). Moreland also included a rehabilitation aspect to the proposed Sibaya Precinct development.

5.4.3 Concept of Eco-estates

Several issues were highlighted about golf and eco-estates within the study area. Golf courses and gated estates are driving the development market faster than most would like to see. There are also concerns about so much land carrying so few people.

Eco-estates are approximately 300 – 400 ha and the kind of biodiversity is restricted to those things that do not move – plants and insects. Developers usually protect endemics and make it part of their policy to protect them.

Concerns were also raised about the fencing of properties and the cutting off connectivity corridors between ecosystems and restricting the movement of wildlife. These estates are also high water use land uses and in a water-scarce country, and on a coastline where communities are, from time- to- time faced with water restrictions, these estates' water consumption is of concern. Most of these estates hold a tourist component and the tourist industry is a high waster use industry itself – large numbers of people at a given time, water features, washing of dishes, laundry, sanitation for large numbers of people, and huge water consumption by golf courses.While some developers, like Moreland, appear to adhere to a strict EMP, not all others do.

"Eco-estates are the most unfriendly estates built. In the case of Simbithie eco-estate, developers built a road through a wetland, cut the roots of trees holding the river bank to put in sewer pipes and are mixing cement in the wetlands, among other things.." (White, Female, Environmental Group).

5.4.4 Perception on State of the Environment

Table 5.5 Perceptions on state of the environment

Ecosystems	Estuaries			Coastal forest			Dunes			Grassland			Beaches			Wetland		
% User Group	P	F	G	P	F	G	P	F	G	P	F	G	P	F	G	P	F	G
Developers	40	60	0	10	70	0	30	60	10	10	70	20	10	70	20	30	60	10
Environmental	80	20	0	60	40	0	80	20	0	80	20	0	30	60	10	60	40	0
Managers	60	40	0	60	40	0	70	30	0	70	30	0	10	80	10	60	40	0
Tourism	30	70	0	50	50	0	20	70	10	60	30	10	10	60	30	50	50	0
CBOs	60	20	0	50	50	0	80	20	0	80	20	0	40	50	10	60	40	0
% Total sample	**54**	**42**		**46**	**58**		**56**	**40**	**4**	**60**	**34**	**6**	**20**	**64**	**16**	**52**	**46**	**2**

Poor = major ecological degradation arising from a combination of anthropogenic influences (high impact)
Fair = noticeable degree of ecological degradation (moderate impact)
Good = no noticeable anthropogenic influences (low impact)

The majority of the respondents indicated the state of the environment as 'poor' to 'fair'. The ecosystems where the 'poor' rating outweighed the 'fair' rating (in order of magnitude) are: grasslands (60%), dunes (56%), estuaries (54%) and wetlands (52%). Ecosystems where the 'fair' rating outweighed the 'poor' (in order of magnitude) are: coastal forests (58%) and beach (64%).

According to Goodman (2000), all grasslands in Kwazulu – Natal should be considered severely threatened, as it is this habitat that is at most risk from transformation. Grassland conversion usually involves the replacement of palatable species by unpalatable ones. According to Armstrong (undated), many animal species

can be found in both forest and grassland and sometimes require a combination of both to satisfy their life history and ecological requirements, such as the red duiker, bushpig, certain bird species and certain snake species.

These animals require grasslands for foraging, and in the case of bird species, to visit flowering plants in winter when flowers are scarce in forests. Furthermore, animals such as the blue duiker (which is strictly forest dependent) may cross through grassland when moving between forests (Bowland, 1997a, 1990; cited in Armstrong, undated).

Grasslands in the study area are being converted at an alarming rate for the construction of golf courses and development. Several respondents have stated that there is an increase in snakes that are not coast dependent in the northern parts of the study area. It is believed that these snakes are from thorny bushy areas and grassland, and it is the large amount of development occurring in the grasslands that is driving them from their natural habitats. Not only are grasslands being transformed, but the landscape connectivity between remaining patches is declining because of fenced estates. This is leading to the reduction in plant and animal numbers in remaining patches.

With regard to destruction of dunes, the entire coastline of the study area is a case in point. Large developments are occurring on primary dunes and there exists a lack of understanding about how fragile these ecosystems are. At Umdloti, forests are being destroyed to accommodate residential and holiday flats on a 41m secondary dune. The removal of frontal vegetation (which is adapted to salt spray), is exposing vegetation

further back to salt, to which it is not adapted. This is causing in a series of vegetation die-back, resulting in the destabilising of the dune. Respondents have stated that this dune is collapsing. Properties built on this dune are being thrown up on retaining walls. This dune also forms a prominent feature of the study area. There is a total disregard for the Admiralty Reserve, where it technically does exist and people build on primary dunes. Coastal forest is under threat mainly from developers who are using natural areas as a major sell point of their projects.

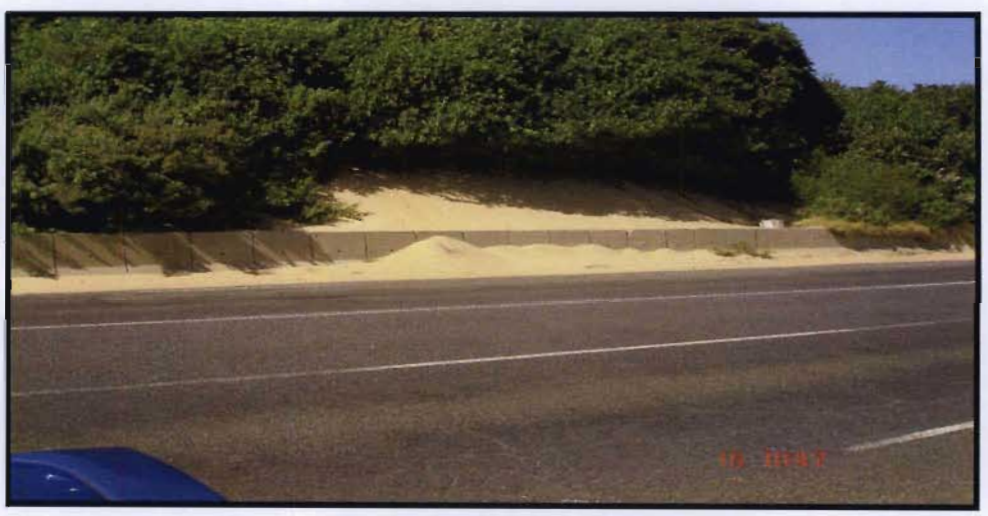


Plate 7: Dune blow-out on M4 at Tongaat Beach

Plate 8: Construction activities on primary dune at Westbrook beach

Plates 9a, b: Development on seaward facing side and crest of secondary dune at Umdloti

Agricultural practices have traditionally had high impacts on estuaries and wetlands in the study area, with agricultural practices running right down to the river banks. Catchment degradation on estuaries and the marine environment in terms of sediment and organic nutrients are currently having the highest impacts on the coastline and are both local as well as regional problems. This impacts on both fisheries and livelihoods. The cause is general urbanisation and development however high volume tourist spots are being most severely threatened. This is because infrastructure cannot cope with the numbers of people at a given time ie. during peak tourist seasons. Many

of the coastal properties in the northern part of the study area still operate on septic tank conditions and there are issues with seepage of sewer into the sea at Sheffield Beach. Efforts are currently under way to upgrade and pump the effluent into existing reticulated systems.

The Mhlanga Lagoon has already exceeded its designed capacity as to the amount of licensed sewage it can accommodate. DWAF has an ecological state that it would like to see estuaries in, and while the amount of sewage is only about half of what has been granted to be put in, environmental monitoring is indicating that the estuary is up to its level.

Beaches are becoming high on the agenda of all municipalities because of the Blue Flag status and the potential for sustainable tourism as a result. In order for a beach to attain Blue Flag status, it has to meet strict environmental, management and infrastructural requirements. The beach at Ballito recently lost its Blue Flag status due to poor water quality.

A further threat to estuaries is from development. Development is built with no regard for 1: 100 year flood lines and also potential erosion line from the coast. Such was the case of the La Mercy recreation area which was built in a highly active zone and was subsequently damaged by floods in 2001 (Kitchen, 2004) (Plates 10a, b & c). The area has since been rehabilitated.

Plates 10a, b, c: Flood damage to recreation area at La Mercy in 2001 (Kerr, 2001)

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 General Conclusion

Overwhelming evidence, emanating from the results and discussion, point toward two important drivers of development on this coastline – tourism and the demand for residential development from the high income sector. Evidence also suggests that the development juggernaut, fuelled by the necessity for economic growth, job creation and the desire to make money is gaining momentum. The general consensus amongst coastal stakeholders is that the coastline of the study area is heading for high development pressure. According to Mather (2005), there are approximately 17 000 units that are expected to come up in the study area within the next two years. National and Provincial policies such as the SDI and KwaZulu – Natal Product Development Strategy certainly support this pressure for tourist development.

The time series analysis of land use/cover change indicates significant increases in the amount of land being committed to development in the 20 year period under investigation – 16.5% (906.82 ha) in 1983 and 26% (1 424.08 ha) in 2003. This development trend is likely to continue, especially in light of the build up to the 2010 soccer world cup event, which is another big driver of development in the area. Development is currently concentrated along the beach strip and it hypothesised that once this strip is exhausted, the development inertia will turn towards land adjacent to rivers and estuaries.

In the rush to develop the study area, the question of whether development has a sustainability focus begs to be asked. The majority of coastal stakeholders (56% of total respondents) felt that current development trends are compromising the principles of sustainable development as set out in the White Paper. The coastline of this study area, as with others like it, is being developed (in theory) on the basis of a coalition – between humanity and the environment. However, according to many stakeholders, there exist no trade offs - the only thing being sustained is development.

Development in the study area appears to be highly skewed in the favour of certain lobby groups (primarily developers, politicians and the affluent), hence 'excluding' legitimate concerns such as environmental groups, and widening the gap between the rich and poor. It is generally believed that there exists no scorecard at present to gauge whether the development boom will result in long-term skilled employment and a reduction in poverty and concurrent social and health problems.

Furthermore, the majority of responses (over 50%) stated that the revenue generated from development in general and tourism in particular, was not being counterbalanced with environmental management, either at all or not to the extent that it should be. In fact, environmental concerns are being rationalised rather than being expanded, such as the emphasis on landscaping as opposed to actual conservation and maintenance of ecological diversity of ecosystems. One of the biggest threats to the study area is the way development is taking place in grasslands, dunes, estuaries and wetlands in ways that compromise the functioning of those ecosystems.

Instruments for regulating land use in the study area are at best poor and ineffective. In fact, zones and schemes were found, not only to be outdated, but also overly generous in awarding rights to development that is compromising the beach strip of the study area. The problem is further compounded by the fact that much of the land in the said beach strip has gone from public to private ownership. In terms of current legislation, and the lack of a Coastal Management Act, one cannot force a developer not to develop any area.

A plethora of environmental and development legislation exists, however, there is a crucial pitfall – the dual process between planning and development legislation on the one hand, and environmental legislation on the other. A number of respondents have indicated that as it stands planning has nothing to do with the environment and that current legislation (DFA and the Ordinance No. 27 of 1949 in particular) is actually aiding bad land use development rather than curbing it. A larger portion of stakeholders felt that differing interpretations and application of legislation by the various government departments and confusion in the permission granting process for development is what is contributing to the development juggernaut. This also ties in with the problems with lack of capacity in municipal departments, the lack of expertise in both the private and public sectors (especially with reviewing EIAs and EMP follow-ups), and the duplication of work by various departments responsible for the management of one natural resource. All these aspects are currently 'permitting' many developers to get away with various non-compliance aspects.

While the Coastal Management Bill and LUMS will provide the legal apparatus to tighten the noose on development, it may be too late to curtail the rate and pace of development.

6.2 Recommendations

- The concept of 'sustainable development' as defined by Brundtland was a brilliant start and is enshrined in the White Paper, but evidence of its meaninglessness is clearly evident form the findings of this research. There is a need to go beyond that. The problematic issue about the concept, and certainly on this coastline, is 'development'. Sustainable development looks at the economic returns on investment. Other options need to be considered, such as 'sustainability' and sustainable livelihoods, implying the translation of benefits to future generations. . This is currently being explored in the SCL projects. According to Bulman (2004), five or six assets form the foundation for sustainable livelihoods – natural, social, human, physical, financial + *political*. It is how people in an area put together those assets to which they have access (in varying degrees) that allows them to create livelihoods for themselves. Political assets are crucial and it determines the extent to which people have access to the political process.

- Environment versus development clearly needs to be more rigorously explored in the study area. According to Goodman (2000), "from a development perspective, the procedures broadly embraced by Integrated Environmental Management attempt to review opportunities and constraints assessments with a proposal, and aims to establish the context for decision-making in terms of

environmental costs (or benefits) weighed alongside social and economic benefits (or costs). The conservation value of the environment is one of the key constraints or opportunities for development and may be sufficient to rule out any further consideration of alternative land proposal, no matter what the 'benefit'". Hence, many coastal managers and environmental groups in the study area are calling for coastal SEAs (which may be linked with the IDP).

SEAs are driven by sustainability because they inform decision-makers of the opportunities and constraints that the environment (social, economic, biophysical) offers to development (Govender, *et al.*, 2001). Because it is strategic, it looks at cumulative impacts (holistic), and not just project-specific/footprint as in the case of EIA. Furthermore, it focuses on the maintenance and enhancement of a chosen level of environmental quality, rather than minimising individual impacts (Govender, *et al.*, 2001). SEAs can be a particularly useful tool for managing land use, especially if linked with a Geographic Information System. Political support for SEAs is crucial if it is to work.

- Capacity building in municipalities is crucial to the study area, but not just in terms of training and increasing numbers. There needs to be an environmental ethic linked with capacity building. Capacity issues are built by senior management and until senior management sees environmental issues as part of the mainstream, a lot of compliance concerns will not be realised.

- There is a need to explore alternate ways to engage genuine public participation in the study area. There needs to be ongoing stakeholder consultation beyond just scoping. Participation needs to be included in the planning, implementation and operational phases. The community and environmental networks in the area are highly active and could be an important component for monitoring EMPs for instance. The participation process should also be formalised and people who attend meetings on a voluntary basis (such as people who have to take time off work to attend meetings) should be compensated.

- In relation to compliance with EMPs, municipalities can look to the option of a fidelity fund where developers are required to deposit money calculated on the basis of potential environmental damage for rehabilitation and compliance (Bulman, 2004). If they do not perform, money is taken from the fund to ensure they perform.

- The way that authority is given for development needs to be re-looked at and re-worked. Legislation is fixed (for a given time anyway) and should not allow room for various interpretations. There needs to be consistency in the permission granting process, accountability and transparency. There is no option for personal lobbying when decisions taken affect the public.

The consolidation of different departments dealing with a specific resource needs to be looked at. This should avoid duplication, confusion as to jurisdictional aspects and consistencies in a chosen level of environmental

quality such as water quality standards, which largely determine important aspects like safety for consumption and whether it will be detrimental to the health of the resource users.

- The study area is on the east coast of South Africa and is perceived as a water rich area, however South Africa is a water scarce country, and part of management plans should include the management of high water use land uses, beyond providing potable water and sanitation. Highly intense recreational areas (which the study area is likely to be in the near future) deserves special attention, because its consumption levels are high. Does the possibility exist for a consumption policy?

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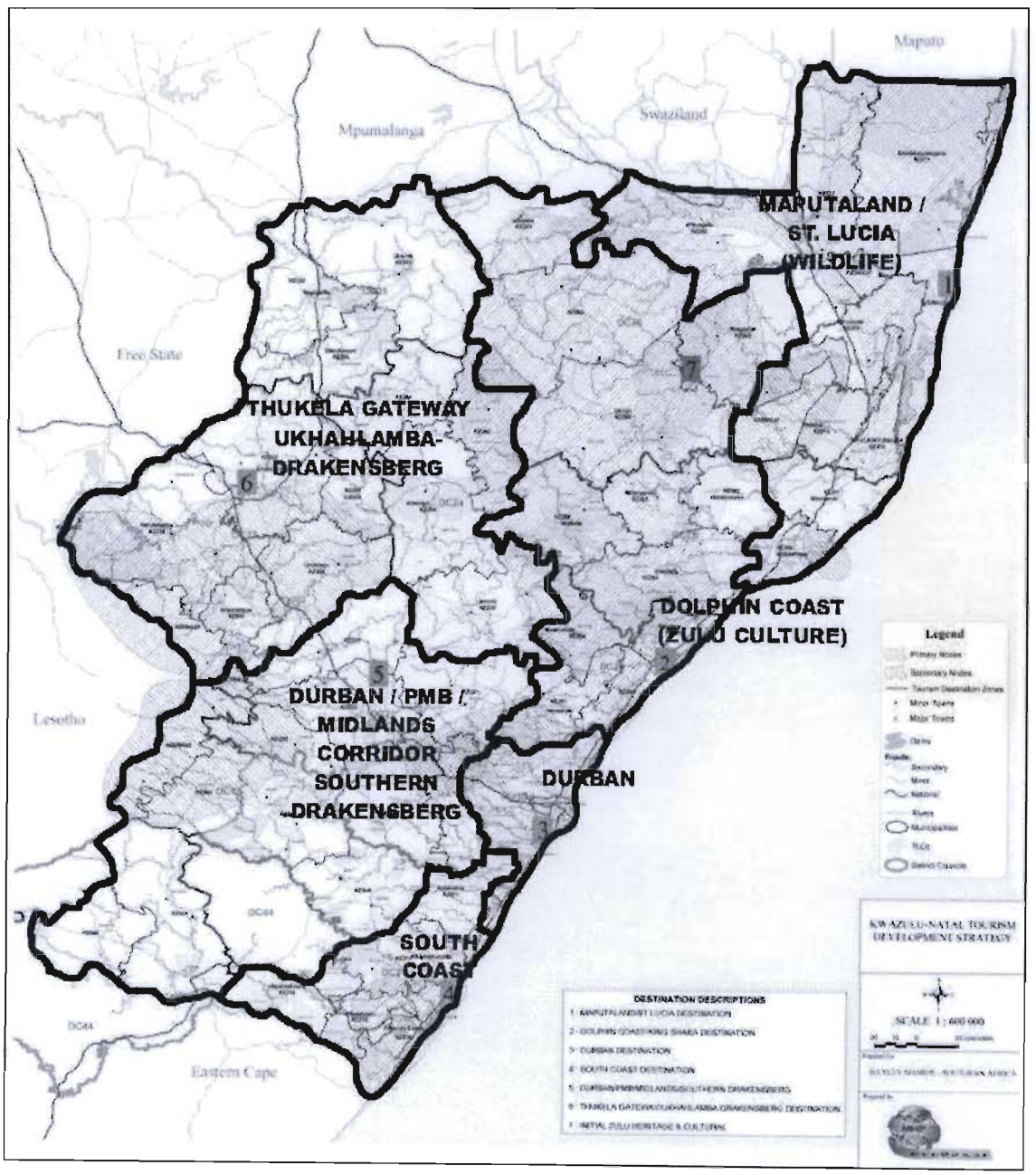
Meetings Attended:

KwaZulu – Natal Department of Environmental Affairs – Coastal Management Unit meeting, held at the Umhlanga Shark's Board on 30 September 2004.

KwaZulu – Natal Department of Environmental Affairs – Coastal Management Unit Meeting, held at the Salt Rock Hotel on 26 October 2004.

APPENDICIES

APPENDIX I: KwaZulu – Natal Tourism Product Development Strategy: Proposed Spatial Coastal and Interior Destinations Framework (2005)



APPENDIX II: QUESTIONNAIRE

SCHOOL OF ENVIRONMENTAL SCIENCES

Department of Geography

University of KwaZulu - Natal (Westville Campus)

Topic: The Impacts of Tourist and Residential Development on the KwaZulu – Natal Coastline: Umhlanga Rocks to Salt Rock

Researcher: Fathima Ahmed

All responses will be treated in the strictest confidence

[Municipalities/Planners/Managers, Environmental Organisations, Developers, CBO and Tourism Organisations]

Please state the name and function of the organization that you work for.

_____

Please state your specific job description within this organization.

_____

A. Overall Development within the Study Area

1. What are the factors driving development on this coastline, and especially so within the last two years? **[All sectors]**

_____

_____

_____

2. The White Paper for Sustainable Coastal Development in South Africa has set three objectives that coastal development should promote: social equity through improved

livelihoods for poor communities, a healthy coastal environment for the benefit of future generations, and economic development that makes best use of available resources. In your opinion, is current development in the tourist and residential sectors contributing to or in conflict with these objectives? Please explain. **[All sectors]**

OBJECTIVES	CONFLICT	CONTRIBUTE	UNSURE
Social			
Environmental			
Economic			

3. Are there any particular development activities that are generating demand for tourist and residential development? **[All sectors]**

4. Where do you see an *oversupply, undersupply or appropriate level* of land use with regard to the following land uses? Please elaborate for each response. **[All sectors]**

Land Use Type	O/Supply	U/Supply	Appropriate
Recreation			
Agriculture			
Residential			
Transport Routes			
Shops & Offices			
Hotel & Holiday Flats			
Natural Open Space			

5. Has there been anything specific about land use development and growth in your area that you dislike? **[All sectors]**

6. Has there been anything specific about land use development and growth in your area that you like? **[All sectors]**

7. Who is the target market for general residential and tourist development in the area? **[All sectors]**

8. What is the predominant type of ownership of property in the area? **[All sectors]**

OCCUPANCY	
ABSENTEE	

9. Who are the major land owners in the area? **[Local Authorities/Planners/Managers]**

B. Legislation

10. What are the four most important legislations governing development activity within your coastal zone? **[All sectors]**

11. Have you experienced any conflicts or constraints in legislation governing your activity within the coastal zone? **[All sectors]**

12. What instruments exist for regulating land use, and have they been successful? **[Local Authority/Planners/Managers]**

13. Please state and explain three most important non-compliance issues in your municipal coastal area. **[Local Authorities/Planners/Managers, Environmental Groups]**

C. Stakeholder Participation

14. How would you rate the opportunities presented to you for participation in the development of this coastline? Please explain. **[All sectors]**

INADEQUATE	SATISFACTORY	GOOD	VERY GOOD

15. How successful are you in preventing bad land use decisions? **[Environmental Groups]**

D. State of the Environment

16. What are your perceptions on the state of the environment? Please give reasons/explanations for your responses. **[All sectors]**

Ecosystems	Poor	Fair	Good
Beach			
Dunes			
Estuaries			
Wetland			
Coastal forest			
Grassland			

Poor – major ecological degradation arising from a combination of anthropogenic influences (high impact)
Fair – noticeable degree of ecological degradation (moderate impact)
Good – no noticeable anthropogenic influences (low impact)

17. Is/how is revenue generated from tourism (the industry and development) and rates and taxes on the development boom counterbalanced with environmental management? **[All sectors]**

18. How are you contributing to the conservation of biodiversity in your development activity? **[Developers]**

19. Do you feel that gated golf and eco-estates are genuinely contributing to the preservation or just 'window dressing'? Please explain. **[Environmental Groups]**

General Comments

What are your perceptions of the study area in the next five to ten years?

Are there any comments that you would like to make?

Thank you for your time and cooperation. It is hoped that your responses will make a valuable contribution to coastal zone management.

Supervisor for this research:
Dr. S. Pillay
031 – 260 7654

Co-supervisor for this research:
Mr. J.S. Lutchmiah
031 – 260 7934

APPENDIX:III Standardised South African land use/cover classification system and Associated Description (Source: CSIR, 2001)

1. FOREST and WOODLAND
All wooded areas with greater than 10% tree canopy cover, where the canopy is composed of mainly self-supporting, single stemmed, woody plants >5 m in height. Essentially indigenous tree species, growing under natural or semi-natural conditions (although it may include some localised areas of self-seeded exotic species). Excludes planted forests (and woodlots). Typically associated with the Forest and Savanna biomes in South Africa

1.1 Forest
Tree canopy cover > 70%. A multi-strata community, with interlocking canopies, composed of canopy, subcanopy, shrub and herb layers.

1.2 Woodland
Tree canopy cover between 40-70%. A closed-to-open canopy community, typically consisting of a single tree canopy layer and a herb (grass) layer.

1.3 Wooded Grassland
Tree canopy cover between 10-40%. An open-to-sparse canopy community, typically consisting of a single tree canopy layer and a herb (grass) layer.

2. THICKET, BUSHLAND, SCRUB FOREST and HIGH FYNBOS
Communities typically composed of tall, woody, self-supporting, single and/or multi-stemmed plants (branching at or near the ground), with, in most cases no clearly definable structure. Total canopy cover > 10%, with canopy height between 2 - 5 m. Essentially indigenous species, growing under natural or semi-natural conditions (although it may include some localised areas of self-seeded exotic species, especially along riparian zones). Typical examples are Valley Bushveld, Mopane bush, and tall Fynbos. Dense bush encroachment areas would be included in this category.

2.1 Thicket
Areas of densely interlaced trees and shrub species (often forming an impenetrable community). Composed of multi-stemmed plants with no clearly definable structure or layers, with > 70% cover. A typical example would be Valley Bushveld.

2.2 Scrub Forest
Vegetation intermediate in structure between true forest and thicket. A multi-layered community with interlocking canopies, with > 70% cover.

2.3 Bushland
Similar to "thicket", but more open in terms of canopy cover levels. Composed of multi-stemmed plants with no definable structure or layers, and with < 70% cover.

2.4 Bush Clumps
Scattered islands of thicket-like vegetation (i.e. > 70% cover) within a matrix of more open bushland or grassland.

2.5 High Fynbos (Heathland)
Fynbos communities between 2 - 5 m in height, > 70% cover, and composed of multi-stemmed evergreen bushes typically growing on infertile soils. The Proteaceae family typically dominates.

3. SHRUBLAND and LOW FYNBOS
Communities dominated by low, woody, self-supporting, multi-stemmed plants branching at or near the ground, between 0.2 - 2 m in height. Total tree cover < 1.0%. Low shrublands and heathlands are combined at Level 1 due to similar overall physiognomic structure and (in many cases) appearance on remotely sensed imagery. Examples would include low Fynbos, Karoo and Lesotho (alpine) communities.

3.1 Shrubland
Typically broad-leaved or bushes, frequently deciduous. A typical example would be vegetation from the Karoo biomes. Category also includes dwarf succulent shrublands.

3.2 Low Fynbos (Heathland)
Typically small-leaved (i.e. nanophyllous), sclerophyllous, evergreen plants growing on infertile soils. Proteaceae, Ericaceae and Restionaceae frequently dominate.

4. HERBLAND
Communities dominated by low, non-woody, self-supporting, non-grass like plants, between 0.2 - 2 m in height. Total tree cover < 1.0%. Typical vegetation examples are found in Namaqualand, and `weed' dominated degraded areas.

5. GRASSLAND
All areas of grassland with less than 10% tree and/or shrub canopy cover, and greater than 0.1% total vegetation cover. Dominated by grass-like, non-woody, rooted herbaceous plants. Typically associated with the Grassland Biome.

5.1 Unimproved Grassland
Essentially indigenous species, growing under natural or semi-natural conditions.

5.2 Improved Grassland
Planted grassland, containing either indigenous or exotic species, growing under man-managed conditions for grazing, hay or turf production, recreation (e.g. golf courses).

6. FOREST PLANTATIONS
All areas of systematically planted, man-managed tree resources, composed of primarily exotic species (including hybrids). Category includes both young and mature plantations

that have been established for commercial timber production, seedling trials, and woodlots/windbreaks of sufficient size to be identified on satellite imagery. Unless otherwise stated, Levels 1 and 2 include clear-felled stands within plantations. Excludes all non-timber based plantations such as tea and sisal, as well as orchards used in the production of citrus or nut crops. Level 1 category will include associated land-cover/use's such as roads, fire-breaks and building infrastructure if these are too small to be clearly mapped off the satellite imagery.

7. WATERBODIES

Areas of (generally permanent) open water. The category includes natural and man-made Waterbodies, which are either static or flowing, and fresh, brackish and salt water conditions. This category includes features such as rivers, dams (i.e. reservoirs), permanent pans, lakes, lagoons and coastal waters.

8. WETLANDS

Natural or artificial areas where the water level is at (or very near the land surface) on a permanent or temporary basis, typically covered in either herbaceous or woody vegetation cover. The category includes both fresh, brackish and salt water conditions. Examples include saltmarsh, pans (with non-permanent water cover), reed-marsh or papyrus-swamp and peat bogs.

9. BARREN LANDS

Non-vegetated areas, or areas of very little vegetation cover (excluding agricultural fields with no crop cover, and opencast mines and quarries), where the substrate or soil exposure is clearly apparent.

9.1 Bare Rock / Soil

Natural areas of exposed sand, soil or rock with no, or very little vegetation cover during any time of the year, including rocky outcrops, dunes and gravel plains.

9.2 Degraded Land

Permanent or seasonal, man-induced areas of very low vegetation cover (i.e. removal of tree, bush and/or herbaceous cover) in comparison to the surrounding natural vegetation cover. Category includes major erosion scars (i.e. sheet and gully erosion). Should be sub-divided by Level I vegetation classes i.e. Degraded-Woodland, and Degraded-Grassland wherever possible to allow reconstruction of full class extent. Typically associated with subsistence level farming and rural population centres, where overgrazing of livestock and/or wood-resource removal has been excessive. Often associated with severe soil erosion problems.

10. CULTIVATED LAND

Areas of land that are ploughed and/or prepared for raising crops (excluding timber production). The category includes areas currently under crop, fallow land), and land being prepared for planting. Unless mapping scales allow otherwise, physical class boundaries are broadly defined to encompass the main areas of agricultural activity, and

are not defined on exact field boundaries. As such the class may include small inter-field cover types (i.e. hedges, grass strips, small windbreaks etc), as well as farm infrastructure. Subdivided into:

(i) Subsistence/semi-commercial cultivation: Characterised by numerous small field units in close proximity to rural population centres. Typically dryland crops produced for individual or local (i.e. village) markets. Low level of mechanisation.
(ii) Commercial cultivation: Characterised by large, uniform, well managed field units, with the aim of supplying both regional, national and export markets. Often highly mechanised.
(iii) Irrigated / Non-irrigated: Major irrigation schemes (i.e. areas supplied with water for agricultural purposes by means of pipes, overhead sprinklers, ditches or streams), are characterised by numerous small farm-scale irrigation dams, close proximity to major water sources and/or centre pivot irrigation systems.

10.1 Permanent crops
Lands cultivated with crops that occupy the area for long periods and are not replanted after harvest. Examples would include tea plantations, vineyards, sugarcane and citrus orchards, hops and nuts.

10.2 Temporary crops
Land under temporary crops (i.e annuals) that are harvested at the completion of the growing season, that remains idle until replanted. Examples would be maize, wheat, legumes, potatoes, onions, and lucerne. Lands cultivated with crops that occupy the area for long periods and are not replanted after harvest. Examples would include tea plantations, vineyards, sugarcane and citrus orchards, hops and nuts.

11. URBAN / BUILT-UP LAND
An area where there is a permanent concentration of people, buildings, and other man-made structures and activities, from large village to city scale. Small rural communities are often included within the surrounding land-cover category (i.e. subsistence / semi-commercial agriculture) if mapping scales do not permit identification of such settlements as individual features. Where mapping scales permit, the limits of the urban boundary are delineated to exclude open areas within the built-up region (i.e. vegetated or non-vegetated areas with few or no structures).

11.1 Residential Area
Areas in which people reside on a permanent or near-permanent basis. The category includes both formal (i.e. permanent structures) and informal (i.e. no permanent structures) settlement areas, ranging from high to low building densities, (including smallholdings on the urban fringe).

11.2 Commercial
Non-residential areas used primarily for the conduct of commerce and other mercantile business, typically located in the central business district (CBD).

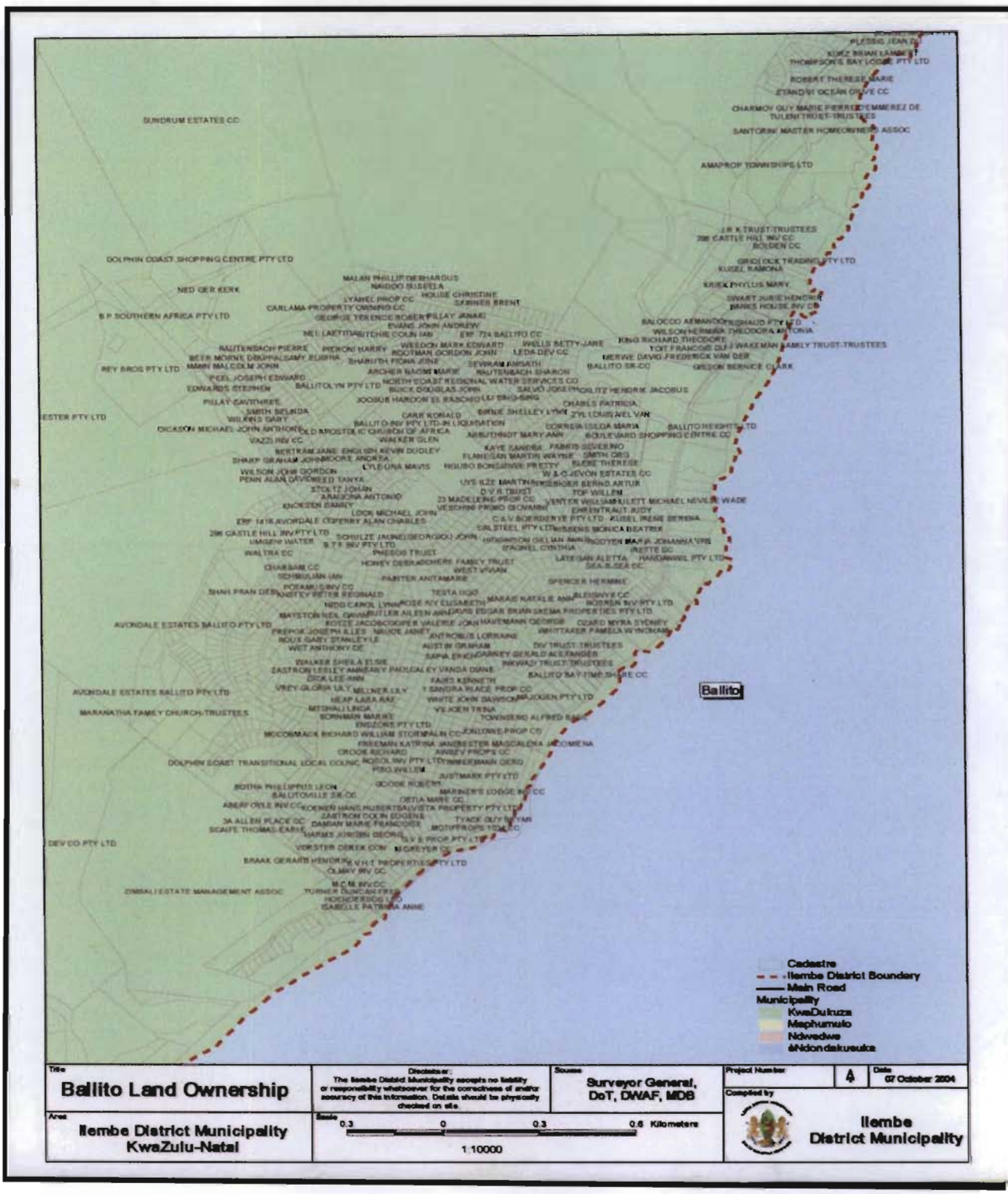
11.3 Industrial / Transport

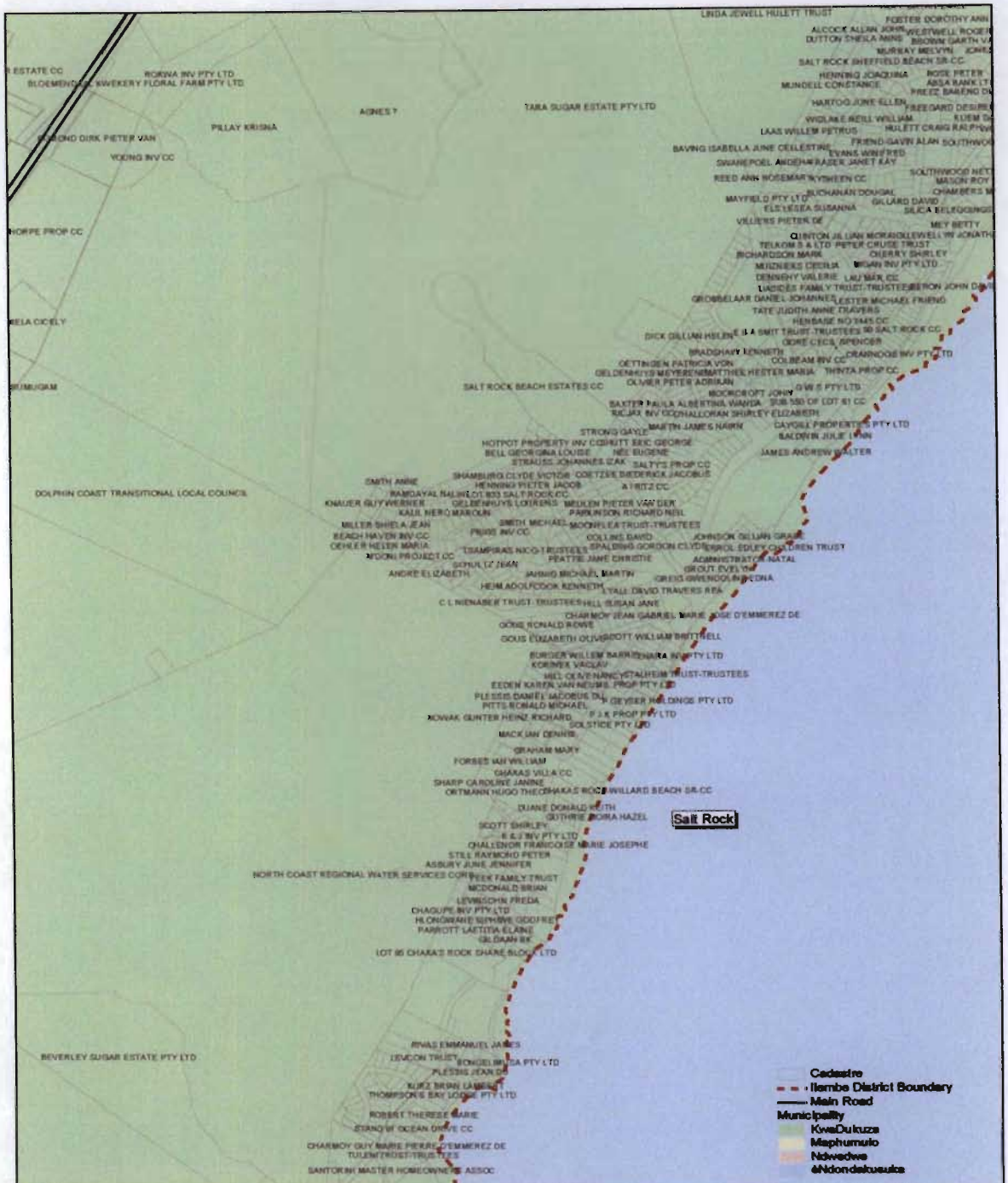
Non-residential areas with major industrial (i.e. the manufacture and/or processing of goods or products) or transport related infrastructure. Examples would include power stations, steel mills, dockyards and airports.

12. MINES and QUARRIES

Areas in which mining activity has been done or is being done. Includes both opencast mines and quarries, as well as surface infrastructure, mine dumps etc, associated with underground mining activities.

APPENDIX IV: Land Ownership maps for Ballito and Salt Rock (2004)





Title: **Salt Rock Land Ownership**	Disclaimer: The Ilembe District Municipality accepts no liability or responsibility whatsoever for the correctness of and/or accuracy of this information. Details should be physically checked on site.	Source: **Surveyor General, DoT, DWAF, MDB**	Project Number: 4 — Date: 07 October 2004
Area: **Ilembe District Municipality KwaZulu-Natal**	Scale: 0.3 0 0.3 0.6 Kilometers — 1:10000		Compiled by: **Ilembe District Municipality**